IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

AVANT LOCATION TECHNOLOGIES LLC, Plaintiff, v. SAMSUNG ELECTRONICS CO. LTD., and SAMSUNG ELECTRONICS AMERICA, INC., Defendants.	§ § § § § § § § § § §	Case No. **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Avant Location Technologies LLC ("ALT" or "Plaintiff") files this Complaint against Defendants, Samsung Electronics Co., Ltd. ("Samsung Electronics") and Samsung Electronics America, Inc. ("Samsung Electronics America") (collectively "Samsung" or "Defendants"), for patent infringement under 35 U.S.C. § 271 and alleges as follows:

THE PARTIES

1. Plaintiff, ALT, is a limited liability company organized and existing under the laws of the State of Texas, with its principal place of business located at 104 E. Houston Street, Suite 140, Marshall, Texas 75670.

2. Defendant Samsung Electronics is a corporation organized and existing under the laws of the Republic of Korea, with its principal place of business at 129 Samsung-Ro, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742, Republic of Korea. Upon information and belief, Samsung Electronics does business in Texas, directly or through intermediaries, and offers its products and/or services, including those accused herein of infringement, to customers and potential customers located in Texas, including in the Judicial District of the Eastern District of Texas.

3. Defendant Samsung Electronics America is a corporation organized under the laws of New York, with its principal place of business at 85 Challenger Road, Ridgefield Park, New Jersey 07660. Upon information and belief, Samsung Electronics America has corporate offices in the Eastern District of Texas at 1303 East Lookout Drive, Richardson, Texas 75082, and 2800 Technology Drive, Suite 200, Plano, Texas 75074. Samsung Electronics America has publicly indicated that, in early 2019, it would be centralizing multiple offices in a new location in the Eastern District of Texas at the Legacy Central office campus,[1] located at 6225 Declaration Drive, Plano, Texas 75023. Samsung Electronics America may be served with process through its registered agent, CT Corporation System, 1999 Bryan Street, Suite 900, Dallas, Texas 75201-3136.

4. Defendants have authorized sellers and sales representatives that offer and sell products pertinent to this Complaint through the State of Texas, including in this Judicial District, and to consumers throughout this Judicial District, such as: Best Buy, 422 West TX-281 Loop, Suite 100, Longview, Texas 75605; AT&T Store, 1712 East Grand Avenue, Marshall, Texas 75670; T-Mobile, 1806 East End Boulevard North, Suite 100, Marshall, Texas 75670; T-Mobile, 900 East End Boulevard North, Suite 100, Marshall, Texas 75670; Verizon authorized retailers, including Russell Cellular, 1111 East Grand Avenue, Marshall, Texas 75670; Victra, 1006 East End Boulevard, Marshall, Texas 75670; and Cricket Wireless authorized retailer, 120 East End Boulevard South, Marshall, Texas 75670

JURISDICTION

5. This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. § 1, *et seq*. This Court has jurisdiction over this action pursuant to 28 U.S.C.

[1] https://news.samsung.com/us/samsung-electronics-america-open-flagship-north-texas-campus/

§§ 1331, 1332, 1338, and 1367.

6. This Court has specific and personal jurisdiction over the Defendants consistent with the requirements of the Due Process Clause of the United States Constitution and the Texas Long Arm Statute. Upon information and belief, the Defendants have sufficient minimum contacts with the forum because each Defendant transacts substantial business in the State of Texas and in this Judicial District. Further, each Defendant has, directly or through subsidiaries or intermediaries, committed and continues to commit acts of patent infringement in the State of Texas and in this Judicial District as alleged in this Complaint, as alleged more particularly below.

7. Venue is proper in this Judicial District pursuant to 28 U.S.C. §§ 1400(b) and 1391(b) and (c) because each Defendant is subject to personal jurisdiction in this Judicial District, has committed acts of patent infringement in this Judicial District, and has a regular and established place of business in this Judicial District. Each Defendant, through its own acts and/or through the acts of each other Defendant, makes, uses, sells, offers to sell, and/or imports infringing products within this Judicial District, regularly does and solicits business in this Judicial District, and has the requisite minimum contacts with this Judicial District, such that this venue is a fair and reasonable one. Further, venue is proper in this Judicial District because Samsung Electronics is a foreign corporation formed under the laws of the Republic of Korea with a principal place of business in the Republic of Korea. Further, upon information and belief, the Defendants have admitted or not contested proper venue in this Judicial District in other patent infringement actions.

PATENTS-IN-SUIT

8. On May 27, 2014, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 8,738,040 (the "'040 Patent") entitled "Method and System for Monitoring a Mobile Station Presence in a Special Area." A true and correct copy of the '040 Patent is attached

as Exhibit 1.

9. On June 26, 2018, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,009,720 (the "'720 Patent") entitled "Method and System for Monitoring a Mobile Station Presence in a Special Area." A true and correct copy of the '720 Patent is attached as Exhibit 2.

10. On May 26, 2015, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 9,042,910 (the "'910 Patent") entitled "Method and System for Monitoring a Mobile Station Presence in a Special Area." A true and correct copy of the '910 Patent is attached as Exhibit 3.

11. On January 13, 2015, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 8,934,922 (the "'922 Patent") entitled "Method and System for Monitoring a Mobile Station Presence in a Special Area." A true and correct copy of the '910 Patent is attached as Exhibit 4.

12. On August 25, 2015, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 9,119,030 (the "'030 Patent") entitled "Method and System for Monitoring a Mobile Station Presence in a Special Area." A true and correct copy of the '030 Patent is attached as Exhibit 5.

13. On November 1, 2016, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 9,485,621 (the "'621 Patent") entitled "Method and System for Monitoring a Mobile Station Presence in a Special Area." A true and correct copy of the '621 Patent is attached as Exhibit 6.

14. On April 11, 2017, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 9,622,032 (the "'032 Patent") entitled "Method and System for Monitoring

a Mobile Station Presence in a Special Area." A true and correct copy of the '032 Patent is attached as Exhibit 7.

15. ALT is the sole and exclusive owner of all right, title, and interest to and in the '040, '720, '910, '922, '030, '621, and '032 Patents (collectively, the "Patents-in-Suit"), and holds the exclusive right to take all actions necessary to enforce its rights to the Patents-in-Suit, including the filing of this patent infringement lawsuit. ALT also has the right to recover all damages for past infringement of the Patents-in-Suit as appropriate under the law.

16. ALT has at all times complied with the marking provisions of 35 U.S.C. § 287 with respect to the Patents-in-Suit.

FACTUAL ALLEGATIONS

17. The Patents-in-Suit generally cover systems and methods for providing flexibility to mobile telephone networks by associating these networks with new special areas securely and without the need to modify any radio transmitting device.

18. The '040 Patent generally relates to a method for monitoring a mobile station presence in a special area, and to a mobile system, a server, a radio transmitting device, and a mobile station suitable for carrying out such a method. The inventions described in the '040 Patent were developed by Carlos A. Perez LaFuente of Afirma Consulting & Technologies, S.L.

19. The '720 Patent generally relates to a method for monitoring a mobile station presence in a special area, and to a mobile system, a server, a radio transmitting device, and a mobile station suitable for carrying out such a method. The inventions described in the '720 Patent were developed by Carlos A. Perez LaFuente of Afirma Consulting & Technologies, S.L.

20. The '910 Patent generally relates to a method for monitoring a mobile station presence in a special area, and to a mobile system, a server, a radio transmitting device, and a

mobile station suitable for carrying out such a method. The inventions described in the '910 Patent were developed by Carlos A. Perez LaFuente of Afirma Consulting & Technologies, S.L.

21. The '922 Patent generally relates to a method for monitoring a mobile station presence in a special area, and to a mobile system, a server, a radio transmitting device, and a mobile station suitable for carrying out such a method. The inventions described in the '922 Patent were developed by Carlos A. Perez LaFuente of Afirma Consulting & Technologies, S.L.

22. The '030 Patent generally relates to a method for monitoring a mobile station presence in a special area, and to a mobile system, a server, a radio transmitting device, and a mobile station suitable for carrying out such a method. The inventions described in the '030 Patent were developed by Carlos A. Perez LaFuente of Afirma Consulting & Technologies, S.L.

23. The '621 Patent generally relates to a method for monitoring a mobile station presence in a special area, and to a mobile system, a server, a radio transmitting device, and a mobile station suitable for carrying out such a method. The inventions described in the '621 Patent were developed by Carlos A. Perez LaFuente of Afirma Consulting & Technologies, S.L.

24. The '032 Patent generally relates to a method for monitoring a mobile station presence in a special area, and to a mobile system, a server, a radio transmitting device, and a mobile station suitable for carrying out such a method. The inventions described in the '032 Patent were developed by Carlos A. Perez LaFuente of Afirma Consulting & Technologies, S.L.

25. Defendants have infringed and continue to infringe the Patents-in-Suit by making, using, selling, offering to sell, and/or importing, and by actively inducing others to make, use, sell, offer to sell, and/or import products, including mobile phones and tablets that implement the technology claimed by the Patents-in-Suit. For example, the Accused Products are Samsung products that implement SmartThings Find, which include, but are not limited to, Galaxy

smartphones and tablets running Android 8 or later, Galaxy Watch devices with Wear OS or running Tizen 5.5 or later, and Galaxy Buds+ or later. Exhibit 8, available at https://www.samsung.com/us/smartthings/. The SmartThings Find feature has been available on the Accused Products as of October 30, 2020. Exhibit 9, available at https://www.samsungmobilepress.com/press-releases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices?path=%2Fpressreleases%2Fsamsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices.

26. Defendants have had actual notice of the Asserted Patents, at least as of the filing date of this complaint.

27. ALT has, at all times, complied with the marking provisions of 35 U.S.C. § 287 with respect to the Asserted Patents.

COUNT I
(Infringement of the '040 Patent)

28. Paragraphs 1 through 27 are incorporated by reference as if fully set forth herein.

29. ALT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the '040 Patent.

30. Defendants have and continue to directly infringe the claims of the '040 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, at least by making, using, offering to sell, selling, and/or importing into the United States products, such as the Accused Products, that satisfy each and every limitation of one or more claims of the '040 Patent, and by performing each and every limitation of one or more method claims of the '040 Patent.

31. The Accused Products each comprise the system of at least claim 13 of the '040 Patent: A mobile station, comprising: observing means to observe a channel and process any

received signal in order to determine whether or not it is receiving a defining signal, a processor to process any received defining signal and to determine, based on a previously obtained checking data, whether or not the defining signal received is a distinctive defining signal that at least partially defines a special area, to determine whether or not it is present in one or more special areas, and to send an updating signal at least one of (i) periodically, (ii) when the mobile station enters into or exits from one of the special areas, and (iii) when the mobile station remains into a special area to a mobile telephone network about its presence in one or more of the special areas, where said updating signal sending is uncorrelated to any mobile station phone call establishment and is based on the last determination performed by the mobile station about its presence in the special areas.

32. The Accused Products comprise an observing means to observe a channel and process any received signal in order to determine whether or not it is receiving a defining signal. For example, Samsung SmartThings Find "offline finding" service includes the use of a "helping" mobile station that comprises observing means to observe a Bluetooth channel related to the offline finding service and process any received signal in order to determine whether or not it is receiving an offline finding service defining signal. Within the Samsung Galaxy offline finding service a missing Bluetooth device that is part of the Samsung Galaxy Find network for offline finding transmits a BLE distinctive defining signal indicative that it is in an offline status (i.e., it is lost). The helping mobile station observes a BLE channel corresponding to the offline finding service signals transmission and process any received signal to determine whether or not it is receiving an offline finding service defining signal that comprises an offline finding service identifier.

> *A device is "offline" when it is disconnected from a mobile network, or in the case of Galaxy wearables, disconnected from your Galaxy smartphone.*

Exhibit 9, available at https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

33. For example, within Samsung SmartThings Find a user may register his/her Galaxy devices such that he/she may keep them located when they are nearby, by using the SmartThings mobile app. As illustrated below, Samsung Find also provides an "offline finding" mode wherein users´ lost Galaxy devices (smartphones, tablets, smartwatches, earbuds, smart tags) that are registered within the Galaxy Find network for offline finding can be found with the help of devices (*e.g.*, smartphones) that observes a BLE channel wherein offline finding service signals are transmitted and processes the received signals. For example, the mobile station is a Samsung Galaxy smartphone registered within SmartThings Find "offline finding" and helping to find a missing Galaxy device that is offline and is part of the Galaxy Find network. The missing Galaxy device that is offline and is part of the Galaxy Find network for offline finding is the radio communication defining device transmitting the distinctive defining signal.

> If you lost your Galaxy phone, tablet, watch, or earbuds, you don't need to worry. The SmartThings Find feature allows you to lock, locate, or completely wipe your data. Even your Samsung Wallet payment information can be locked or erased, and all of this can be done remotely. There are also similar services available for your watch and earbuds within the Galaxy Wearable app.

Exhibit 10, available at https://www.samsung.com/us/support/answer/ANS00080182/

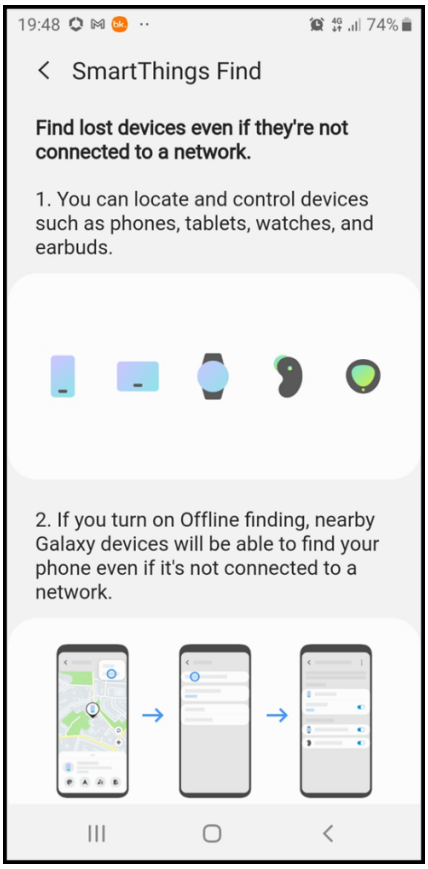


Figure 1: Smart Things mobile application, Tutorials

34. For example, if a Galaxy device that is part of the Galaxy Find network for offline finding (*i.e.*, a radio communication defining device) has gone offline for 30 minutes, it starts emitting a Bluetooth Low Energy signal (*i.e.*, a distinctive defining signal) that can then be picked up by any "helping" Samsung Galaxy smartphone or tablet that is part of the Find network for offline finding.

Offline Doesn't Mean "Off-the-Grid"

With the SmartThings Find service, you can easily locate your missing device even if it's offline.[7] That's because SmartThings users can now opt in to securely use their Galaxy smartphone or tablet to help others locate their lost devices. Once a device has been offline for 30 minutes, it produces a BLE signal that can be received by other devices. If you report your device as lost via SmartThings Find, any nearby Galaxy smartphone or tablet that has opted into helping find misplaced devices can alert the Samsung server about its location, which will in turn notify you. All SmartThings Find user data is encrypted and securely protected, ensuring that the device's location is not revealed to anyone except its owner.

Exhibit 9, https://www.samsungmobilepress.com/pressreleases/samsung-launches-

smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

35. For example, the following table summarizes the key features of BLE signals. The helping mobile station receives BLE distinctive defining signals from lost Samsung Galaxy devices that are in range.

Feature	BLE
Location Accuracy	< 5 m
Range	Up to 100 m
Frequencies	2.4 GHz

Exhibit 11, available at https://www.inpixon.com/blog/chirp-uwb-ble-location-tracking-techniques

36. For example, the Samsung Galaxy offline finding service involves the use of a "helping" mobile station (a *finder* device) and a BLE radio communication defining device (a lost device) that transmits a BLE distinctive defining signal (a unique beacon).

> The OF protocol uses Bluetooth Low Energy (BLE) to broadcast a unique beacon for a lost device. This beacon is then picked up by nearby Samsung phones or tablets (the *finder* devices), which then forward the unique beacon, along with the location it was detected at, to a Samsung managed server. The owner of a lost device can then query the server to locate their device.

Exhibit 12, at 1, Abstract.

37. For example, the Samsung Galaxy offline finding protocol has different modes of operation, depending on the type of device to be located (*e.g.*, a lost mobile device or a lost smart tag in some examples below).

> The OF protocol has multiple modes of operations that depend on the functions supported by the devices involved as well as the type of device to be located.

Exhibit 12, at 7, § 3.2.

38. For example, when the lost device is a mobile device, the lost mobile device advertises a signal indicative of the offline finding service (*i.e.*, a signal with service identifier UUID: FD69). This signal is a Bluetooth distinctive defining signal transmitted by the radio communication defining device (*i.e.*, transmitted by the lost Samsung Galaxy mobile station in this example). The distinctive defining signal also comprises an identifier of the lost device (*i.e.*, the private ID).

3.2.2 Offline (Lost) Device Operation. When a OF registered device no longer has an active network connection, it enters 'Lost Mode' and triggers the Offline Finding service to start. The lost device then creates a GATT server profile and starts advertising on the main OF service UUID (FD69).

Lost Mode Advertising. the lost mode advertisements are the fundamental part of the OF protocol. The lost device generates an advertisement containing a unique identifying payload (the private ID) which is picked up by a helper and reported to Samsung.

Figure 2 describes the full advertisement payload is then generated using the current Private ID and two other bytes of information.

Byte 0	1	2	3	4	5	6	7	8	9	10	11	12	Byte 13
Operation mode / hop count	Private ID												Settings/ support info byte

Exhibit 12, at 8, § 3.2.2.

39. For further example, when the lost device is a smart tag that is registered within Samsung offline finding, the lost smart tag advertises a signal indicative of the offline finding service (*i.e.*, a signal with service identifier UUID: FD5A). This signal is a Bluetooth distinctive defining signal transmitted by the radio communication defining device (*i.e.*, transmitted by the lost Samsung Galaxy smart tag in this example). The distinctive defining signal also comprises an identifier of the lost device (*i.e.*, the private ID). The smart tag supports three different offline finding modes (only the *offline mode* and the *overmature offline mode* triggers the sending of a presence updating signal to the Samsung Cloud).

BLE Advertisement. A SmartTag broadcasts BLE data that any nearby online device can pick up. A non-registered tag broadcasts on UUID FD59, which allows an online device to discover its presence before the registration procedure. A registered tag broadcasts a 20-byte payload that follows a fixed structure on UUID FD5A, which allows the tag to participate in the OF network.

Exhibit 12, at 10, § 4.2.4.

Advertisement Structure. Figure 6 shows the advertisement structure of the OF data broadcasted by a SmartTag. Byte 0 stores the tag version, advertisement type, and tag state. Bytes 1-3 are the aging counter. Bytes 4-11 correspond to the first 8 bytes of a privacy ID selected from the privacy ID pool of the tag, which uniquely associates the tag with the Samsung account it is registered to.

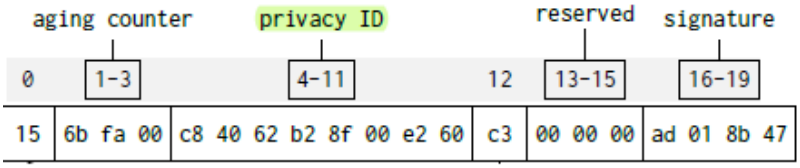


Figure 6: The OF Advertisement Structure for SmartTags

Tag State (Byte 0) Bits 5-7 of Byte 0 in the OF data of SmartTags store the operating state of a tag. There are six different tag states

Bits 5-7	Name	Description
001 (1)	Premature Offline Mode	the tag has recently been disconnected
010 (2)	Offline Mode	the tag has remained disconnected for over 15 minutes
011 (3)	Overmature Offline Mode	the tag has stayed in Offline Mode for over 24 hours
100 (4)	Paired with one device	the tag is paired to a device
101 (5)	Connected to one device	the tag is connected to a device
110 (6)	Connected to two devices	the tag is connected to two devices

Table 12: Operating States of a SmartTag

Helper devices in Samsung's OF network will only report locations of SmartTags in Offline or Overmature Offline mode.

Exhibit 12, at 16-17, § 4.5.1.

40. For example, the helping mobile station observes a channel corresponding to the offline finding service BLE signals transmission and process any received signal to determine whether or not it is receiving an offline finding service defining signal that comprises an offline finding service identifier. *See, e.g.*, in the case of a lost mobile device, the service identifier is the

one with UUID: FD69; *see also, e.g.*, in the case of a lost smart tag, the service identifier is the one with UUID: FD5A. If the signal comprises an offline finding service identifier, at that point it is a defining signal for the "helping" mobile station.

41. The Accused Products comprise a processor to process any received defining signal and to determine, based on a previously obtained checking data, whether or not the defining signal received is a distinctive defining signal that at least partially defines a special area, to determine whether or not it is present in one or more special areas. For example, a processor within the helping mobile station processes any received defining signal and uses data previously stored in the mobile station (i.e., checking data), to determine whether or not the BLE defining signal received is a distinctive defining signal that at least partially defines the offline finding service special area. If the helping mobile station determines that it is receiving a distinctive defining signal it consequently identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it, as detailed below). Within SmartThings Find every Galaxy smartphone enabled for "offline finding" is converted into a receiver and locator, which effectively crowdsources the search of a missing device. Any device registered within SmartThings Find for "offline finding" becomes a Find Node of the Find network and may receive and process the offline finding BLE defining signals from lost Galaxy devices.

Exhibit 13, available at https://www.samsung.com/my/apps/smartthings-find/.

42. For example, the special area can be defined by the area covered by the Bluetooth

distinctive defining signals of all the radio communication defining devices that are part of the Galaxy Find network for offline finding and are in an offline status at a given time. So, the special area is a dynamic-crowdsourced special area. The area covered by a given Bluetooth distinctive defining signal from a lost radio communication defining device that is in an offline status at least partly defines the special area. A user can make his/her Galaxy devices to join the Galaxy Find network by using the SmartThings mobile app. In the first image below the user registers within Find, in connection to the user´s account, a Samsung Galaxy J6 ("this device") and a Galaxy A30. The user subsequently registers both devices for offline finding, as illustrated in the second image below. The user can locate the devices by using the Find map (third image below).

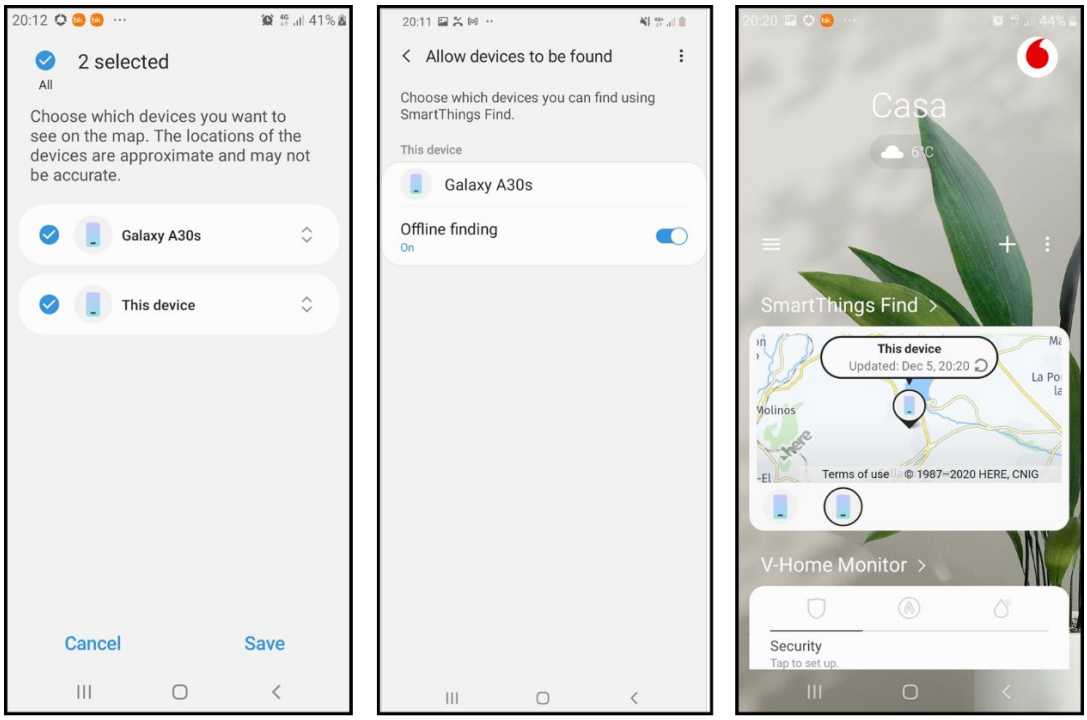


Figure 2: SmartThings mobile application, Register Device for Offline Finding

43. For example, a processor helps the mobile station in determining whether or not a received defining signal is a distinctive defining signal that at least partly defines a special area and whether or not the mobile station is present in the offline finding service special area. When

the lost device is a mobile device the result of the scan by the helping mobile station of advertisements with service identifier FD69 (*i.e.*, the service identifier of the offline finding service for lost Galaxy mobile devices) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (i.e., the privacy ID) by processing the distinctive defining signal.

> *3.2.3 Online (Helper) Device Operation.* When a device with OF enabled is online, it periodically scans over BLE. This scan is performed with a scan filter that makes sure only advertisements with the OF service's UUID (FD69) are returned from the scan. If there are any lost mode devices nearby, the helper device picks up their advertisements and parses through the data to extract the lost device's private ID.

Exhibit 12, at 9, § 3.2.3.

44. For example, the helping mobile station scans a BLE channel and is able to filter advertisements with service identifier FD69. To perform such filtering (*i.e.*, to determine that a defining signal with an offline finding service identifier is a distinctive defining signal with the FD69 service identifier) the mobile station must necessarily store data related to the FD69 service identifier (*i.e.*, store previous obtained checking data) and use the data to perform the filtering (*i.e.*, the determination). When the lost device is a smart tag the result of the scan by the helping mobile station of advertisements with service identifier FD5A (*i.e.*, the service identifier of the offline finding service for lost Galaxy smart tags) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (*i.e.*, the privacy ID) by processing the distinctive defining signal.

> *4.5.1 Helper-Tag Interaction.* A registered tag broadcasts OF advertisements on UUID FD5A continuously. Any active Galaxy device with "FindMyMobile" (FMM) enabled is a helper device that participates in Samsung's OF network. A helper device regularly scans for BLE advertisement data from nearby SmartTags. It filters BLE advertisements based on the advertising UUID for SmartTags (FD5A).

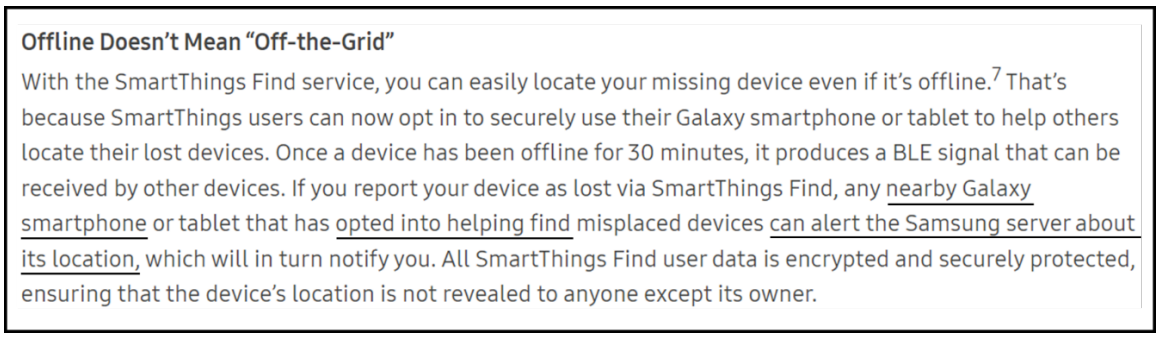
Exhibit 12, at 16, § 4.5.1.

> *4.5.2 Helper-Server Interaction.* A Helper Device stores found lost SmartTags in a local database together with other lost FMM/FME devices discovered by the Helper. The database can store a maximum of 1000 devices using the privacy ID of the device as the key.
>
> The helper device will report geolocations of lost SmartTags in the database based on estimated locations received from the WiFi or GPS service.

Exhibit 12, at 17, § 4.5.2.

45. For example, the helping mobile station scan a BLE channel and is able to filter advertisements with service identifier FD5A. To perform such filtering (*i.e.*, to determine that a defining signal with an offline finding service identifier is a distinctive defining signal with the FD5A service identifier) the mobile station must necessarily store data related to the FD5A service identifier (*i.e.*, store previous obtained checking data) and use the data to perform the filtering (*i.e.*, the determination). The helping mobile station sends to a mobile telephone network, and the mobile telephone network routes to the Samsung Cloud servers (Samsung is a provider of presence related services), a signal that identifies that the mobile station is nearby the missing device that is part of the Galaxy Find network (*i.e.*, it is present in the special area). Further, when nearby the lost radio communication defining device, the mobile station receives the distinctive defining signal. The helping mobile station is able to identify that the received defining signal is distinctive and to determine that it is present within the crowdsourced offline finding special area, as detailed above. The BLE distinctive signal must include a device identifier such that the Galaxy Find services related to the found device can be later provided in connection to that device, as elaborated

below.



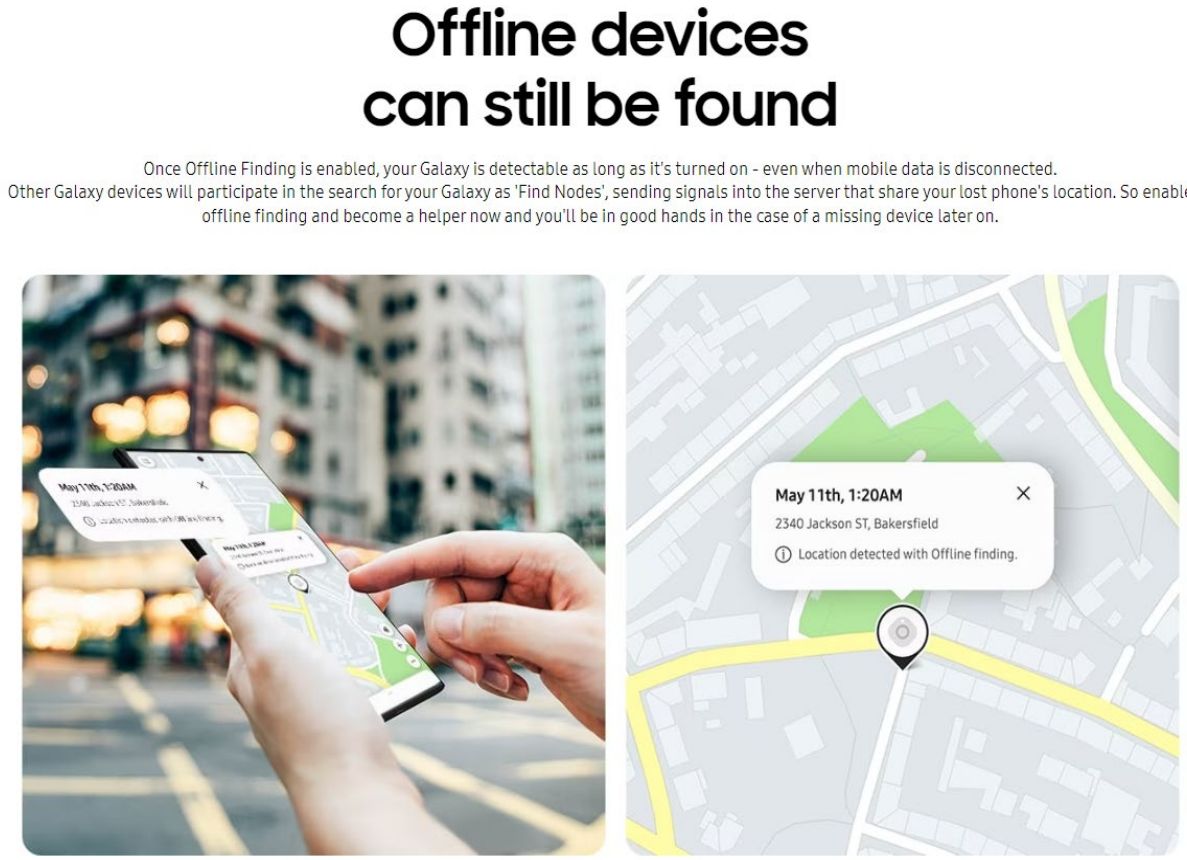
Offline Doesn't Mean "Off-the-Grid"

With the SmartThings Find service, you can easily locate your missing device even if it's offline.[7] That's because SmartThings users can now opt in to securely use their Galaxy smartphone or tablet to help others locate their lost devices. Once a device has been offline for 30 minutes, it produces a BLE signal that can be received by other devices. If you report your device as lost via SmartThings Find, any nearby Galaxy smartphone or tablet that has opted into helping find misplaced devices can alert the Samsung server about its location, which will in turn notify you. All SmartThings Find user data is encrypted and securely protected, ensuring that the device's location is not revealed to anyone except its owner.

Exhibit 9, available at https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices.

46. The Accused Products comprise a processor to send an updating signal at least one of (i) periodically, (ii) when the mobile station enters into or exits from one of the special areas, and (iii) when the mobile station remains into a special area to a mobile telephone network about its presence in one or more of the special areas. For example, as a result of the helping mobile station identifying that it is present in the crowdsourced special area the mobile station sends (encrypted and securely protected) a signal about the mobile station´s presence in the special area to a mobile telephone network, and the mobile telephone network routes the presence updating signal to the Samsung Cloud servers (Samsung is the provider of Galaxy Find "offline finding" presence related services), the signal including the mobile station location as detailed in the image above. Further, in connection to the sending of the presence updating signal to a mobile telephone network, it shall be noted that the helping mobile station is not typically placed at the user´s home when receiving the distinctive defining signal from a lost device, but in a public environment. So, in those scenarios the mobile station is usually not connected to the network via Wi-Fi but through mobile telephony communications (*i.e.*, the updating signal is sent to a mobile telephone network and further routed to the Samsung Cloud servers). The presence signal must also include the device identifier, as it is required by the Samsung Cloud to subsequently provide related presence related

services (*e.g.*, the above referred notification about the device location). The images below indicate that once a helping mobile station has identified that it is nearby a lost device that is in an offline status, the location and the IMEI of the helping mobile station and the device identifier of the lost device are collected to provide the Find service (this information is sent to the Samsung Cloud servers within the updating signal, as it is required to allow the device owner to locate the device, once found by the helping mobile station).



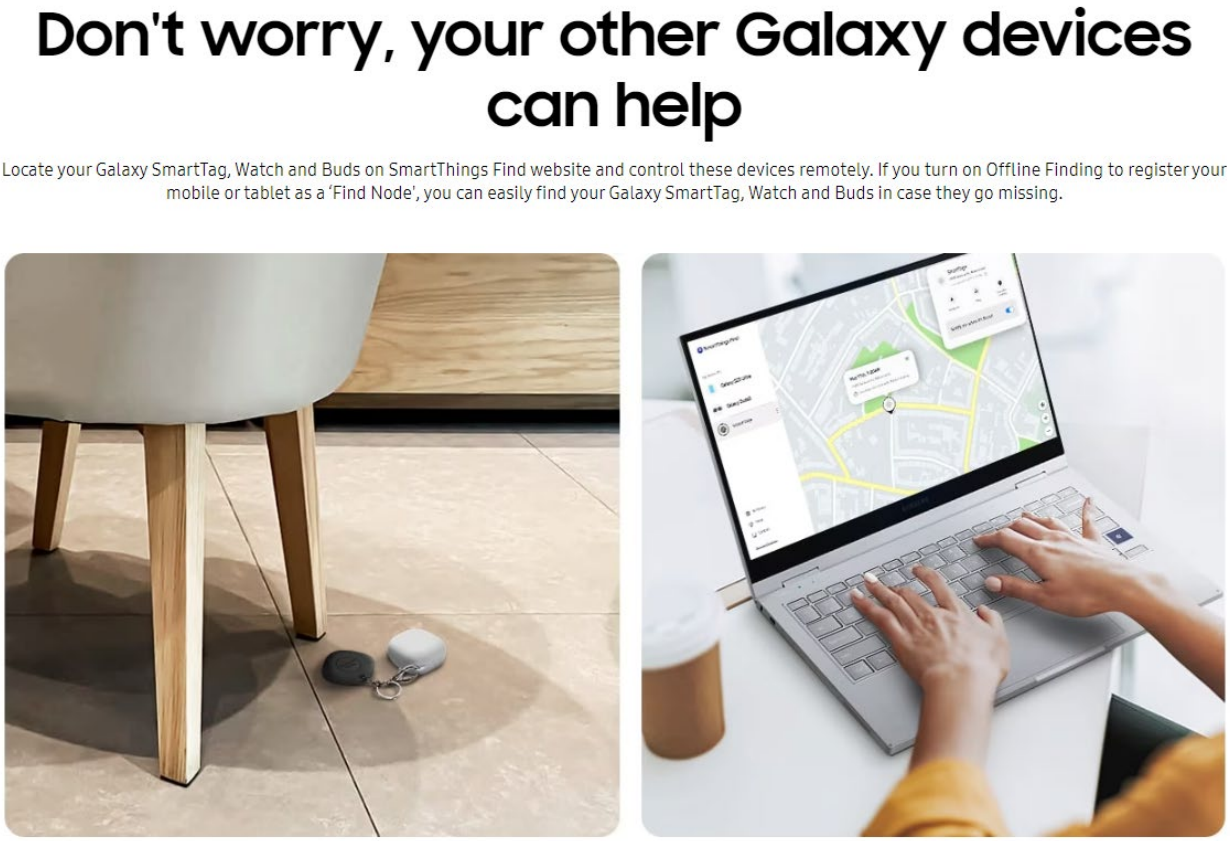


Exhibit 13, available at https://www.samsung.com/my/apps/smartthings-find/.

47. For example, the Samsung Cloud servers (Samsung is the provider of presence related services) receives the presence updating signal, routed from a mobile telephone network, and uses it to provide presence related services, *e.g.*, displaying the "found" device location in a map (as illustrated below in connection to a found smart tag) or, *e.g.*, sending a notification to the owner of the lost device indicating that it has been found.

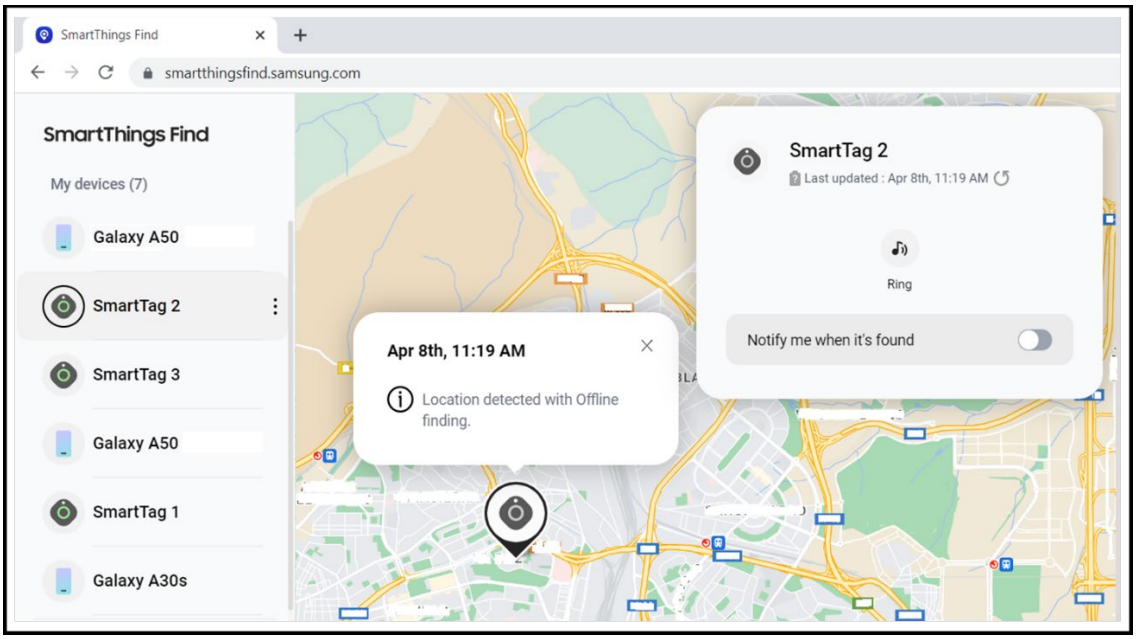


Figure 3: SmartThings mobile application, Location of SmartTag 2

48. For example, the helping mobile station sends a presence updating signal to the Samsung Cloud servers (via the mobile telephone network). As shown below, a "helping" mobile station (a *finder* device) identifies that it is present within the area of coverage of a device that is lost and is part of the Samsung Galaxy offline finding network and sends to a vendor controller server (i.e., to the Samsung Cloud servers in the case of Galaxy devices and Samsung offline finding ecosystem) an updating signal indicative of the presence status (the signal including the unique beacon data received from the lost device via BLE, together with the location of the device).

> In recent years, mobile device manufacturers such as Samsung and Apple have extended their lost-device tracking systems with an *offline finding* (OF) feature, which allows a lost mobile device to be found even when it does not have an internet connection. Both Apple and Samsung OF features share two key features: the use of Bluetooth Low Energy (BLE) for short range transmission of data between devices of a vendor, and crucially, an extensive network of (internet-connected) mobile devices (which we call *finder devices*) that relay location information to a vendor controlled server. We refer to the latter as the *OF network*. The basic idea is quite simple: when a (lost) device loses its internet connection, it starts broadcasting a unique beacon over BLE, which is then picked up by nearby finder devices participating in the OF network, who then forward the beacon and the location it is found to a vendor server.

Exhibit 12, at 1, Introduction

> An active finder device periodically scans for BLE advertisements from nearby FMM devices and reports the locations of those devices to a Samsung's server.

Exhibit 12, at 2, Introduction.

> When a registered device goes offline, it starts advertising a unique payload that identifies itself. This payload is picked up by nearby online (registered) devices which parse the payload extracting the device's identifier. The online device then accesses available location services to find out its own location. It then sends the lost device's identifier and the location through to Samsung. The owner of the lost device can then access the FMM web service to find out its location.

Exhibit 12, at 7, § 3.2.

49. For example, the updating signal is sent to a mobile telephone network, and then routed to the Samsung Cloud servers, when the helping mobile station enters into the special area and starts receiving the distinctive defining signal from the lost radio communication defining device. Also, if the mobile station remains nearby the lost device (i.e., remains into the special area) it periodically sends a presence updating signal to a mobile telephone network (that routes it

the Samsung Cloud servers), as further elaborated below. For example, the helping mobile station stores in a local database the last determination performed by the mobile station about its presence in the special area, in connection to the found device private ID identifier. If there is more than one found device, each last presence determination is stored in the database in connection to the corresponding found device private ID identifier. After the storage, the mobile station stops scanning (*i.e.*, stops the presence determination stops) and sends a presence updating signal containing the (each) lost device private ID and the location to a mobile telephone network (than then routes it to the Samsung Cloud servers). If it is the first (recent) reporting by the helping mobile station about the mobile station presence in the special area, the presence updating signal is then related to the mobile station entering into the crowdsourced offline finding special area.

> 3.2.3 *Online (Helper) Device Operation.* When a device with OF enabled is online, it periodically scans over BLE. This scan is performed with a scan filter that makes sure only advertisements with the OF service's UUID (FD69) are returned from the scan. If there are any lost mode devices nearby, the helper device picks up their advertisements and parses through the data to extract the lost device's private ID. To facilitate multiple lost devices nearby, each helper device maintains a local SQL database in which it adds any lost devices to.
>
> The helper device then stops scanning and starts the location reporting process. Firstly, it accesses the SQL database to get the list of lost devices to report. Then the helper uses any available location services (GPS, Wi-Fi etc.) to pinpoint its own location and record it. The next process differs depending on whether the user has chosen to encrypt their location or not.
>
> - Unencrypted: The helper device creates a HTTPS request containing the lost device's private ID and its unencrypted latitude/longitude. The request is then sent to Samsung's location reporting server.
> - Encrypted: The helper device first contacts Samsung (over HTTPS) to receive a public key. Then it creates another HTTPS request containing the lost device's private ID and its latitude/longitude. The latitude/longitude are encrypted using an Elliptic Curve Integrated Encryption Scheme (ECIES) with the public key that was received from Samsung. The request is then sent to Samsung's location reporting server.

Exhibit 12, at 9, § 3.2.3.

For further example, the helping mobile station receives an acknowledgment about the presence updating signal having been received in the Samsung Cloud servers (via a mobile telephone network), as indicated in the image below. As also indicated in the image below, the presence determination process (i.e., the scanning and filtering of advertisements related to UUID FD69 service identifier) is then reinitiated. If the mobile station remains in the special area in connection to a lost device it has already reported, then it may send (after 20 minutes) a new updating signal related to the mobile station presence in the special area (in connection to that lost device), *i.e.*, the presence updating signal is then related to the mobile station remaining into the crowdsourced offline finding special area.

> In both cases, the helper device receives a response indicating the success of the operation and the lost device location reporting process finished. The helper device returns to scanning but with a timeout (20 mins) for reporting any lost devices it has already reported.

Exhibit 12, at 9, § 3.2.3.

For example, the helping mobile station stores in a local database the last determination performed by the mobile station about its presence in the special area, in connection to the found device private ID identifier. If there is more than one found device, each last presence determination is stored in the database in connection to the corresponding found device private ID identifier. After the storage, the mobile station sends a presence updating signal containing the (up to 5) recently found device(s) private ID(s) and the location to a mobile telephone network (than then routes it to the Samsung Cloud servers). If it is the first (recent) reporting by the helping mobile station about the mobile station presence in the special area, the presence updating signal is then related to the mobile station entering into the crowdsourced offline finding special area.

> *4.5.2 Helper-Server Interaction.* A Helper Device stores found lost SmartTags in a local database together with other lost FMM/FME devices discovered by the Helper. The database can store a maximum of 1000 devices using the privacy ID of the device as the key. A tag is marked as expired if it has not appeared in the BLE scanning for 15 minutes and will be removed from the database.
>
> The helper device will report geolocations of lost SmartTags in the database based on estimated locations received from the WiFi or GPS service. Each request is similar to the one made by the Owner Device to create an OF device profile (see §4.3.6), except that the URL is `/geolocations`, as a Helper Device does not know the `deviceId` of the lost tag. Each location report task allows a maximum of 5 recently found devices ($time_{found} \geq time_{current} - 1$ (minute)) from the local database to be reported.

Exhibit 12, at 17, § 4.5.2.

50. The Accused Products comprise a processor to send an updating signal, where said updating signal sending is uncorrelated to any mobile station phone call establishment and is based on the last determination performed by the mobile station about its presence in the special areas. For example, the helping Samsung Galaxy smartphone sends updating signals to the Samsung servers regardless of whether it is in range of Wi-Fi networks. Therefore, when out of range of Wi-Fi networks the smartphone uses the cellular communications network. From observation, the smartphone establishes no phone call. Therefore, the updating signal is sent over a cellular data connection and is uncorrelated to any mobile station phone call establishment. The updating signal sending is based on the last determination performed by the helping mobile station about its presence in the crowdsourced offline finding special area. *See* Exhibit 12, at 9, § 3.2.3. As already indicated above, the helping mobile station stores in a local database the last determination performed by the mobile station about its presence in the special area, in connection to the (each) found device private ID identifier. After the storage, the mobile station stops the scanning (*i.e.*, the presence determination stops) and sends a presence updating signal that uses the information into the referred local database, *i.e.*, the information about said last presence determination.

> *3.2.3 Online (Helper) Device Operation.* When a device with OF enabled is online, it periodically scans over BLE. This scan is performed with a scan filter that makes sure only advertisements with the OF service's UUID (FD69) are returned from the scan. If there are any lost mode devices nearby, the helper device picks up their advertisements and parses through the data to extract the lost device's private ID. To facilitate multiple lost devices nearby, each helper device maintains a local SQL database in which it adds any lost devices to.
>
> The helper device then stops scanning and starts the location reporting process. Firstly, it accesses the SQL database to get the list of lost devices to report. Then the helper uses any available location services (GPS, Wi-Fi etc.) to pinpoint its own location and record it. The next process differs depending on whether the user has chosen to encrypt their location or not.
>
> - Unencrypted: The helper device creates a HTTPS request containing the lost device's private ID and its unencrypted latitude/longitude. The request is then sent to Samsung's location reporting server.
> - Encrypted: The helper device first contacts Samsung (over HTTPS) to receive a public key. Then it creates another HTTPS request containing the lost device's private ID and its latitude/longitude. The latitude/longitude are encrypted using an Elliptic Curve Integrated Encryption Scheme (ECIES) with the public key that was received from Samsung. The request is then sent to Samsung's location reporting server.

Exhibit 12, at 9, § 3.2.3.

51. For example, the helping mobile station stores in a local database the last determination performed by the mobile station about its presence in the special area, in connection to the (each) found device private ID identifier. After the storage, the mobile station sends a presence updating signal that uses the information into the referred local database, i.e., the information about said last presence determination.

> *4.5.2 Helper-Server Interaction.* A Helper Device stores found lost SmartTags in a local database together with other lost FMM/FME devices discovered by the Helper. The database can store a maximum of 1000 devices using the privacy ID of the device as the key. A tag is marked as expired if it has not appeared in the BLE scanning for 15 minutes and will be removed from the database.
>
> The helper device will report geolocations of lost SmartTags in the database based on estimated locations received from the WiFi or GPS service. Each request is similar to the one made by the Owner Device to create an OF device profile (see §4.3.6), except that the URL is `/geolocations`, as a Helper Device does not know the `deviceId` of the lost tag. Each location report task allows a maximum of 5 recently found devices ($time_{found} \geq time_{current} - 1$ (minute)) from the local database to be reported.

Exhibit 12, at 17, § 4.5.2

52. Defendants have and continue to indirectly infringe one or more claims of the '040 Patent by inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the '040 Patent. Defendants induce this direct infringement through their affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. *See, e.g.*, Exhibit 14, available at https://www.samsung.com/us/smartthings/#get-started (instructions to "Let's get started with SmartThings"); *see also, e.g.,* Exhibit 15, available at https://www.samsung.com/us/support/downloads/?model=N0002100 (providing the product manuals for mobile devices including phones, tablets, wearables, audio, virtual reality, and other mobile accessories).

53. Because of Defendants' inducement, Defendants' customers and end-users use the

Accused Products in a way Defendants intend and they directly infringe the '040 Patent. Defendants perform these affirmative acts with knowledge of the '040 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '040 Patent.

54. Defendants have indirectly infringed and continues to indirectly infringe one or more claims of the '040 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Defendants' affirmative acts of selling and offering to sell the '040 Accused Products in this District and elsewhere in the United States and causing the '040 Accused Products to be manufactured, used, sold, and offered for sale contribute to others' use and manufacture of the Accused Products, such that the '040 Patent is directly infringed by others. The accused components within the Accused Products including, but not limited to, software manufactured by Defendants, are material to the invention of the '040 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Defendants to be especially made or adapted for use in the infringement of the '040 Patent. Defendants perform these affirmative acts with knowledge of the '040 Patent and with intent, or willful blindness, that they cause the direct infringement of the '040 Patent.

55. Because of Defendants' direct and indirect infringement of the '040 Patent, ALT has suffered damages in an amount to be proved at trial.

COUNT II
(Infringement of the '720 Patent)

56. Paragraphs 1 through 27 are incorporated by reference as if fully set forth herein.

57. ALT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the '720 Patent.

58. Defendants have and continue to infringe the claims of the '720 Patent, either

literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, at least by performing each and every limitation of one or more method claims of the '720 Patent.

59. The Accused Products practice the method of at least claim 1 of the '720 Patent: A method associated with the use of a mobile station and a radio communication defining device that transmits a distinctive defining signal, the method comprising: receiving and processing the distinctive defining signal in the mobile station, the distinctive defining signal at least defining a special area by one or more of: (1) a coverage area of the distinctive defining signal; (2) a portion of the coverage area that intersects with another area of coverage of another radio communication defining device; and (3) a sum of the area of coverage and the another area of coverage, the distinctive defining signal including information indicating whether or not the radio communication defining device is in a predetermined environment; and sending from the mobile station via a mobile telephone network an updating signal to one or more servers of a provider of presence related services about the mobile station's presence in the special area, the updating signal being useable by the one or more servers of the provider of presence related services to adjust an operating parameter, which comprises one or more of a tariff and a service flag, to adjust, activate, or deactivate the presence related services provided to the mobile station, and the updating signal comprising the information indicative of whether or not the radio communication defining device is located in the predetermined environment.

60. The Accused Products perform a method associated with the use of a mobile station and a radio communication defining device that transmits a distinctive defining signal. For example, Samsung SmartThings Find implement a method associated with the use of a "helping" mobile station and a missing Bluetooth device that is part of the Samsung Galaxy Find network for offline finding and that transmits a distinctive defining signal indicative that it is in an offline

status (i.e., it is lost).

> *A device is "offline" when it is disconnected from a mobile network, or in the case of Galaxy wearables, disconnected from your Galaxy smartphone.*

Ex. 9, https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

61. For example, within Samsung Find a user may register his/her Galaxy devices such that he/she may keep them located when they are nearby, by using the SmartThings mobile app. As illustrated below, Samsung Find also provides an "offline finding" mode wherein user´s lost Galaxy devices (smartphones, tablets, smartwatches, earbuds, smart tags) that are registered within the Galaxy Find network for offline finding can be found with the help of other devices (e.g., smartphones).

62. For further example, the mobile station is a Samsung Galaxy smartphone registered within SmartThings Find "offline finding" and helping to find a missing Galaxy device that is offline and is part of the Galaxy Find network. The missing Galaxy device that is offline and is part of the Galaxy Find network for offline finding is a radio communication defining device.

If you lost your Galaxy phone, tablet, watch, or earbuds, you don't need to worry. The SmartThings Find feature allows you to lock, locate, or completely wipe your data. Even your Samsung Wallet payment information can be locked or erased, and all of this can be done remotely. There are also similar services available for your watch and earbuds within the Galaxy Wearable app.

Ex. 10, available at https://www.samsung.com/us/support/answer/ANS00080182/ .

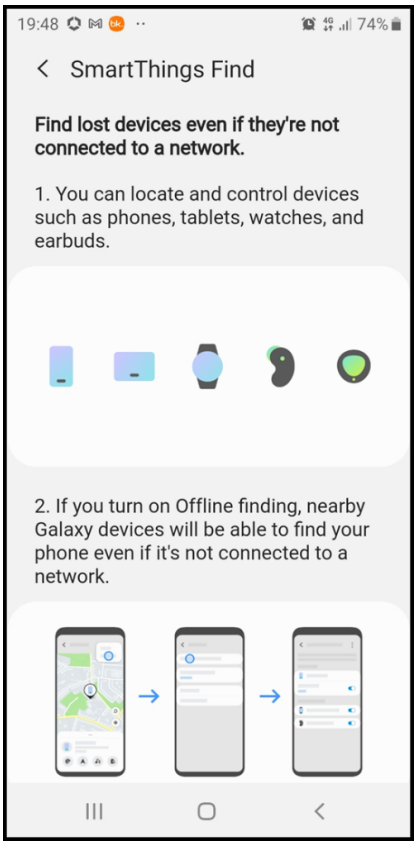


Figure 1: Smart Things mobile application, Tutorials

63. For example, if a Galaxy device that is part of the Galaxy Find network for offline finding (i.e., a radio communication defining device) has gone offline for 30 minutes, it starts emitting a Bluetooth Low Energy signal (i.e., a distinctive defining signal) that can then be picked up by any "helping" Samsung Galaxy smartphone or tablet that is part of the Find network for offline finding.

Offline Doesn't Mean "Off-the-Grid"

With the SmartThings Find service, you can easily locate your missing device even if it's offline.[7] That's because SmartThings users can now opt in to securely use their Galaxy smartphone or tablet to help others locate their lost devices. Once a device has been offline for 30 minutes, it produces a BLE signal that can be received by other devices. If you report your device as lost via SmartThings Find, any nearby Galaxy smartphone or tablet that has opted into helping find misplaced devices can alert the Samsung server about its location, which will in turn notify you. All SmartThings Find user data is encrypted and securely protected, ensuring that the device's location is not revealed to anyone except its owner.

Ex. 9, https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

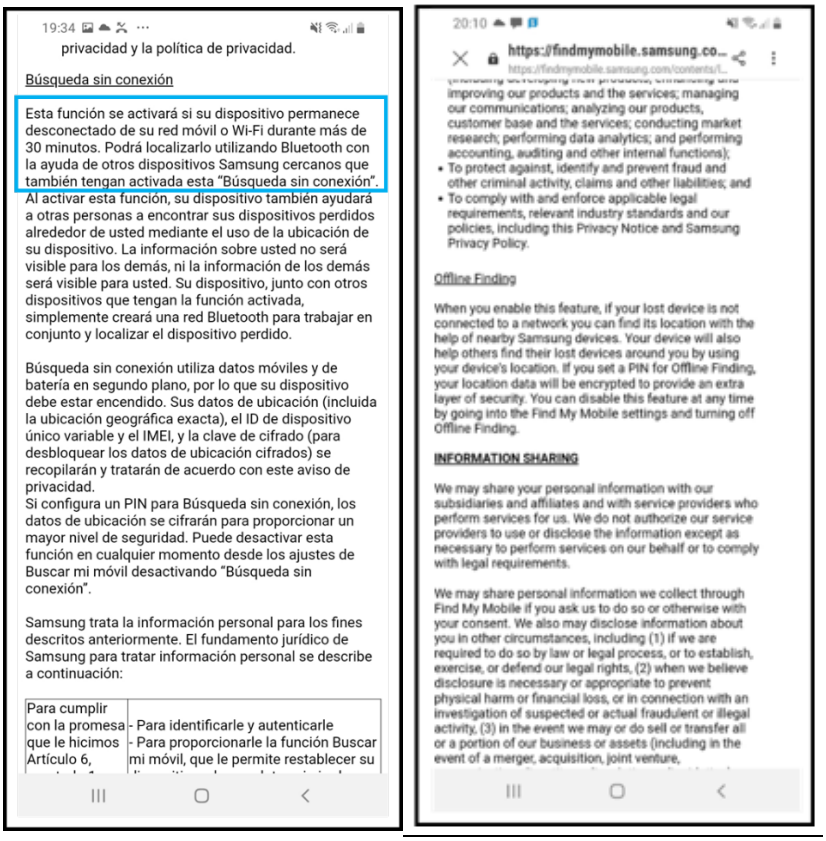


Figure 4: Offline Finding (translated as "The offline finding feature will activate if the device is disconnected from the mobile network or Wi-Fi for more than 30 minutes. It can be located using Bluetooth with the help of other nearby Samsung devices that also have "offline finding" enabled.").

64. For example, Samsung Galaxy offline finding service involves the use of a "helping" mobile station (a *finder* device) and a BLE radio communication defining device (a lost device) that transmits a BLE distinctive defining signal (a unique beacon).

> The OF protocol uses Bluetooth Low Energy (BLE) to broadcast a unique beacon for a lost device. This beacon is then picked up by nearby Samsung phones or tablets (the *finder* devices), which then forward the unique beacon, along with the location it was detected at, to a Samsung managed server. The owner of a lost device can then query the server to locate their device.

Ex. 12, at 1, Abstract.

65. For further example, the Samsung Galaxy offline finding protocol has different modes of operation, depending on the type of device to be located (e.g., a lost mobile device or a lost smart tag in some examples below).

> The OF protocol has multiple modes of operations that depend on the functions supported by the devices involved as well as the type of device to be located.

Ex. 12, at 7, § 3.2

66. For example, when the lost device is a mobile device, the lost mobile device advertises a signal indicative of the offline finding service (i.e., a signal with service identifier UUID: FD69). This signal is a Bluetooth distinctive defining signal transmitted by the radio communication defining device (i.e., transmitted by the lost Samsung Galaxy mobile station in this example). The distinctive defining signal also comprises an identifier of the lost device (i.e., the private ID).

> 3.2.2 *Offline (Lost) Device Operation.* When a OF registered device no longer has an active network connection, it enters 'Lost Mode' and triggers the Offline Finding service to start. The lost device then creates a GATT server profile and starts advertising on the main OF service UUID (FD69).
>
> *Lost Mode Advertising.* the lost mode advertisements are the fundamental part of the OF protocol. The lost device generates an advertisement containing a unique identifying payload (the private ID) which is picked up by a helper and reported to Samsung.
>
> Figure 2 describes the full advertisement payload is then generated using the current Private ID and two other bytes of information.

Byte 0	1	2	3	4	5	6	7	8	9	10	11	12	Byte 13
Operation mode / hop count	Private ID												Settings/ support info byte

Ex. 12, at 8, § 3.2.2

67. For example, when the lost device is a smart tag that is registered within Samsung

offline finding, the lost smart tag advertises a signal indicative of the offline finding service (i.e., a signal with service identifier UUID: FD5A). This signal is a Bluetooth distinctive defining signal transmitted by the radio communication defining device (i.e., transmitted by the lost Samsung Galaxy smart tag in this example). The distinctive defining signal also comprises an identifier of the lost device (i.e., the private ID). The smart tag supports three different offline finding modes (only the *offline mode* and the *overmature offline mode* triggers the sending of a presence updating signal to the Samsung Cloud).

> *BLE Advertisement.* A SmartTag broadcasts BLE data that any nearby online device can pick up. A non-registered tag broadcasts on UUID FD59, which allows an online device to discover its presence before the registration procedure. A registered tag broadcasts a 20-byte payload that follows a fixed structure on UUID FD5A, which allows the tag to participate in the OF network.

Page 10, section 4.2.4.

> *Advertisement Structure.* Figure 6 shows the advertisement structure of the OF data broadcasted by a SmartTag. Byte 0 stores the tag version, advertisement type, and tag state. Bytes 1-3 are the aging counter. Bytes 4-11 correspond to the first 8 bytes of a privacy ID selected from the privacy ID pool of the tag, which uniquely associates the tag with the Samsung account it is registered to.

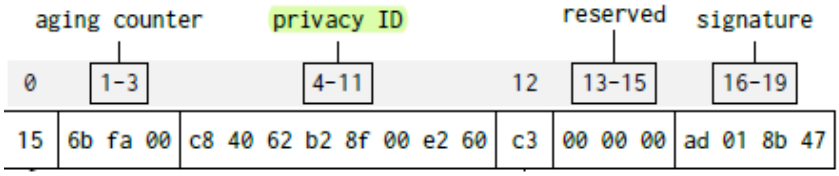


Figure 6: The OF Advertisement Structure for SmartTags

> **Tag State (Byte 0)** Bits 5-7 of Byte 0 in the OF data of SmartTags store the operating state of a tag. There are six different tag states

Bits 5-7	Name	Description
001 (1)	Premature Offline Mode	the tag has recently been disconnected
010 (2)	Offline Mode	the tag has remained disconnected for over 15 minutes
011 (3)	Overmature Offline Mode	the tag has stayed in Offline Mode for over 24 hours
100 (4)	Paired with one device	the tag is paired to a device
101 (5)	Connected to one device	the tag is connected to a device
110 (6)	Connected to two devices	the tag is connected to two devices

Table 12: Operating States of a SmartTag

Helper devices in Samsung's OF network will only report locations of SmartTags in Offline or Overmature Offline mode.

Ex. 12, at 16-17, § 4.5.1.

68. The Accused Products perform receiving and processing the distinctive defining signal in the mobile station, the distinctive defining signal at least defining a special area by one or more of: (1) a coverage area of the distinctive defining signal; (2) a portion of the coverage area that intersects with another area of coverage of another radio communication defining device; and (3) a sum of the area of coverage and the another area of coverage, the distinctive defining signal including information indicating whether or not the radio communication defining device is in a predetermined environment. For example, the helping mobile station receives and processes the signal from the Bluetooth missing device that is in an offline status (i.e., the distinctive defining signal). For example, the special area can be defined by the area covered by the distinctive defining signals of all the radio communication defining devices (e.g., N) that are part of the Galaxy Find network for offline finding and are in an offline status at a given time. So, the special area is a dynamic-crowdsourced special area. Within SmartThings Find every Galaxy smartphone enabled for "offline finding" is converted into a receiver and locator, which effectively crowdsources the search of a missing device. Any device registered within SmartThings Find for "offline finding" becomes a Find Node of the Find network and may receive and process the offline finding signals from lost Galaxy devices.

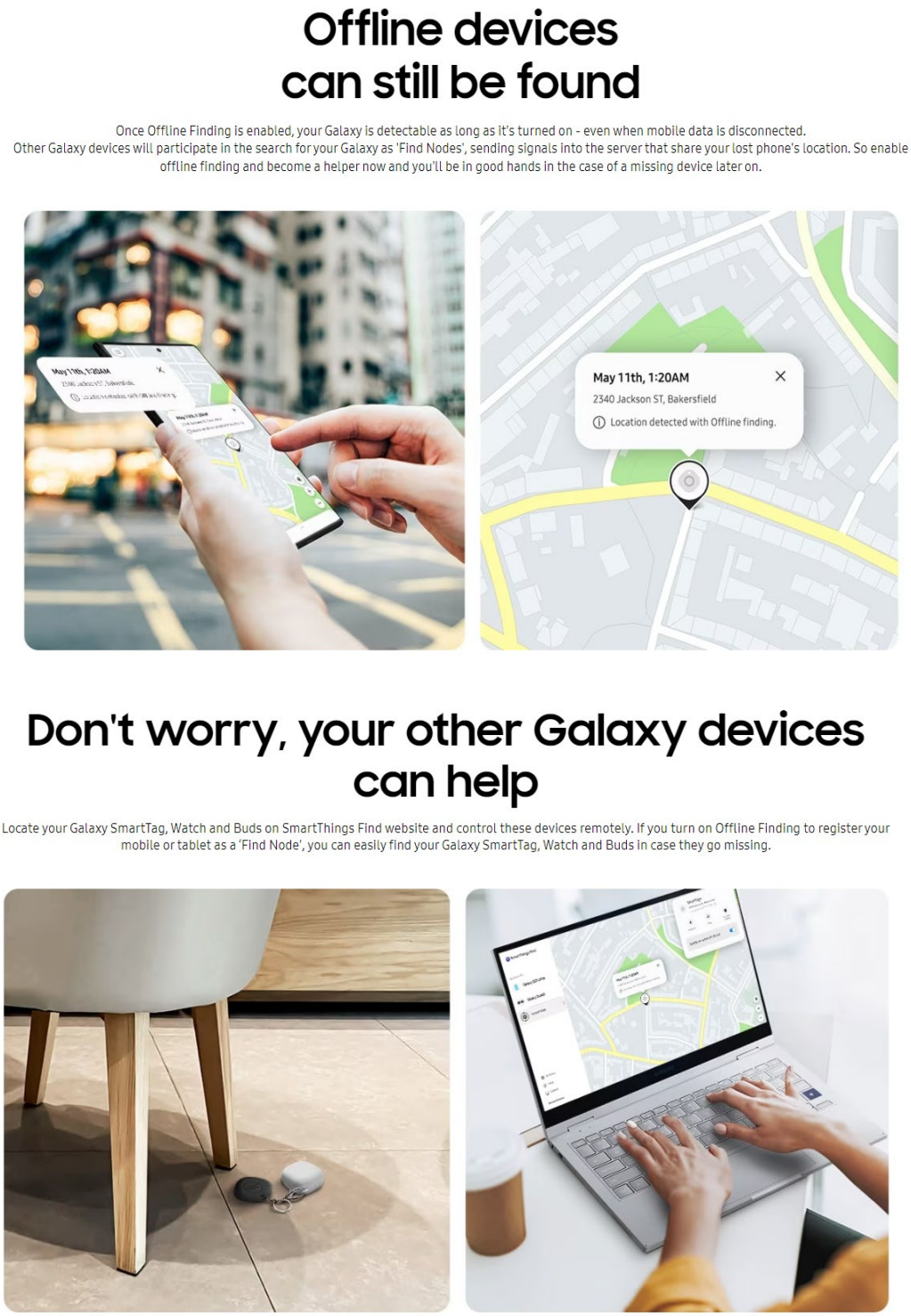


Exhibit 13, available at https://www.samsung.com/my/apps/smartthings-find/.

69. For example, if the radio communication defining device is device 1 of the Galaxy

Find network (being in an offline status) and the rest are devices 2 to N of the Galaxy Find network (being in an offline status) the special area can be defined by: the Bluetooth coverage area of the distinctive defining signal (from device 1), and a sum with the area of coverage of Bluetooth radio communication defining device 2, and a sum with the area of coverage of Bluetooth radio communication defining device N.

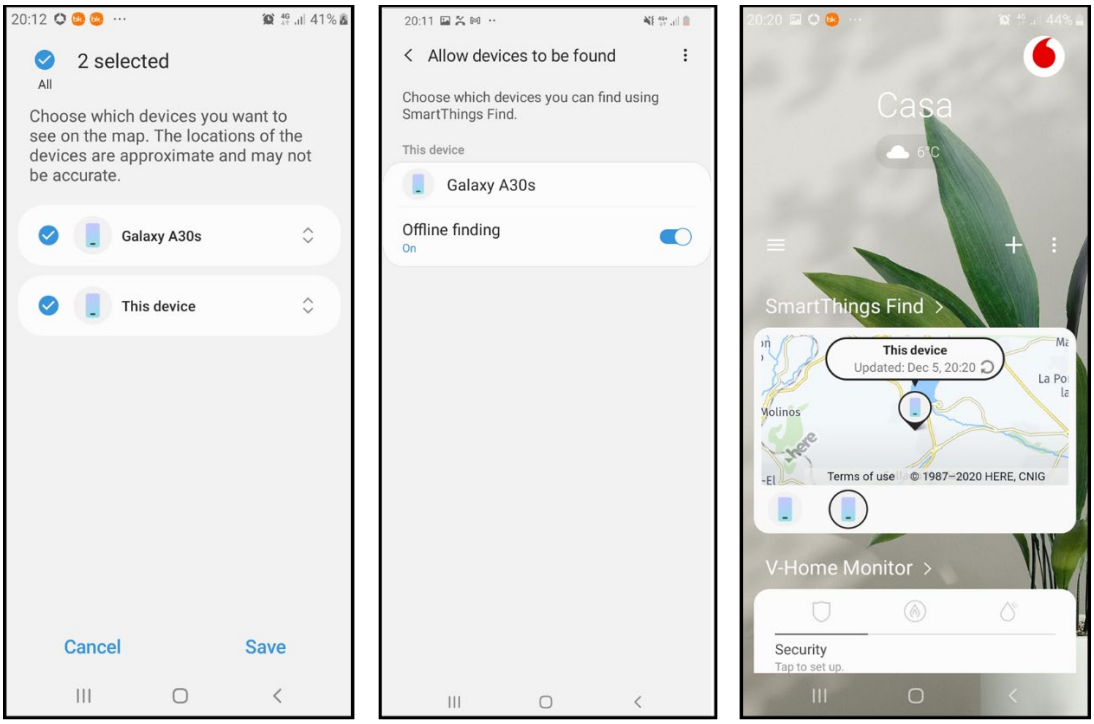


Figure 2: SmartThings mobile application, Register Device for Offline Finding

70. For further example, a user can make his/her Galaxy devices to join the Galaxy Find network by using the SmartThings mobile app. In the first image above the user registers within Find, in connection to the user´s account, a Samsung Galaxy J6 (“this device”) and a Galaxy A30. The user subsequently registers both devices for offline finding, as illustrated in the second image above. The user can locate the devices by using the Find map (third image above).

71. For example, when the lost device is a mobile device the result of the scan by the helping mobile station of advertisements with service identifier **FD69** (i.e., the service identifier of the offline finding service for lost Galaxy mobile devices) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (i.e., the **privacy ID**) by processing the distinctive defining signal.

> *3.2.3 Online (Helper) Device Operation.* When a device with OF enabled is online, it periodically scans over BLE. This scan is performed with a scan filter that makes sure only advertisements with the OF service's UUID (FD69) are returned from the scan. If there are any lost mode devices nearby, the helper device picks up their advertisements and parses through the data to extract the lost device's private ID.

72. For example, when the lost device is a smart tag the result of the scan by the helping mobile station of advertisements with service identifier FD5A (i.e., the service identifier of the offline finding service for lost Galaxy smart tags) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (i.e., the privacy ID) by processing the distinctive defining signal.

> *4.5.1 Helper-Tag Interaction.* A registered tag broadcasts OF advertisements on UUID FD5A continuously. Any active Galaxy device with "FindMyMobile" (FMM) enabled is a helper device that participates in Samsung's OF network. A helper device regularly scans for BLE advertisement data from nearby SmartTags. It filters BLE advertisements based on the advertising UUID for SmartTags (FD5A).

Ex. 12, at 16, § 4.5.1.

> *4.5.2 Helper-Server Interaction.* A Helper Device stores found lost SmartTags in a local database together with other lost FMM/FME devices discovered by the Helper. The database can store a maximum of 1000 devices using the privacy ID of the device as the key.
>
> The helper device will report geolocations of lost SmartTags in the database based on estimated locations received from the WiFi or GPS service.

Page 17, section 4.5.2.

73. For example, as the Bluetooth Low Energy distinctive defining signal is transmitted by the radio communication defining device when it has gone offline for more than 30 minutes, the signal serves to identify (e.g., using a "offline finding service identifier") that the device is in an offline status for offline finding. The offline status of the radio communication defining device (e.g., a Galaxy SmartTag registered within Galaxy Find) implies that it is not located nearby any other Galaxy device of the device owner with capacity to update the location of the missing device and associated to the same Samsung Account (e.g., a Galaxy S23 registered within Find in connection to the same account). If the radio communication defining device is not located nearby those other Galaxy devices it means that it is located in an environment that is outside the environment defined as the sum of the volumetric spaces wherein the BLE signal from the missing user´s device can be received in each of the other user´s Galaxy devices (associated to the same user´s account). Said outside environment is the predetermined environment, and the fact that the distinctive defining signal identifies that the device is offline for offline finding serves to indicate to the mobile station that the device is in the referred predetermined environment. As the predetermined environment depends on the location of the other user´s Galaxy devices, the predetermined environment changes when the location of the other Galaxy devices changes. As an example: a user has registered within Galaxy Find a Samsung Galaxy S23, a Galaxy Buds and a Galaxy Smart Tag, and he has lost the Galaxy Smart Tag. On the basis of the Samsung Galaxy

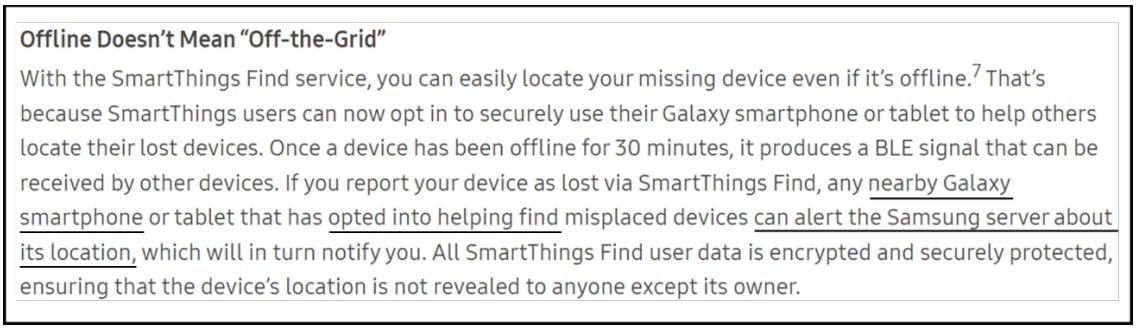
S3 being switched on and with the Bluetooth enabled, the Galaxy SmartTag being offline implies that the SmartTag is located within an environment that is outside the volumetric space wherein the BLE signal from the lost SmartTag can be received in the Samsung Galaxy S23 smartphone. Said outside environment is the predetermined environment The following table summarizes the key features of BLE signals. The referred other user´s Galaxy devices can receive a BLE signal from the Galaxy device when being in range. Otherwise, the Galaxy device is lost and it is in the predetermined environment.

Feature	BLE
Location Accuracy	< 5 m
Range	Up to 100 m
Frequencies	2.4 GHz

Exhibit 11, available at https://www.inpixon.com/blog/chirp-uwb-ble-location-tracking-techniques.

74. For example, the helping mobile station sends via a mobile telephone network to the Samsung Cloud servers (Samsung is a provider of presence related services) a signal that identifies that the mobile station is nearby the missing device that is part of the Galaxy Find network (i.e., it is present in the special area). Further, when nearby the lost radio communication defining device, the mobile station receives the distinctive defining signal. The helping mobile station is able to identify that the received signal is distinctive in that it relates to the offline finding service (e.g., may comprise an "offline finding service identifier") which means that it is transmitted by a BLE Galaxy device that is enabled for offline finding and is in an offline status. By determining that it

is receiving the BLE offline finding signal the helping mobile station also identifies that it is present within the crowdsourced offline finding special area (as the device is part of the Find network for offline finding and its BLE offline finding signal partly defines the special area). The BLE distinctive signal must include a device identifier such that the Galaxy Find services related to the found device can be later provided in connection to that device, as elaborated below.



Ex. 9, available at https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

75. For example, as a result of the helping mobile station identifying that it is present in the crowdsourced special area the mobile station sends (encrypted and securely protected) a signal about the mobile station´s presence in the special area to the Samsung Cloud servers (Samsung is the provider of Galaxy Find "offline finding" presence related services), the signal including the mobile station location as detailed in the image above. A helping mobile station is not typically placed at the user´s home when receiving the distinctive defining signal from a lost device, but in a public environment. So, in those scenarios the mobile station is not connected to the network via Wi-Fi but thought mobile telephony communications, i.e., via a mobile telephone network. The presence signal must also include the device identifier, as it is required by the Samsung Cloud to subsequently provide related presence related services (e.g., the above referred notification about the device location). The first image below (in Spanish) indicates(*) that once a helping mobile station has identified that it is nearby a lost device that is in an offline status, the location and the

IMEI of the helping mobile station and the device identifier of the lost device are collected to provide the Find service (this information is sent to the Samsung Cloud servers within the updating signal, as it is required to allow the device owner to locate the device, once found by the helping mobile station).

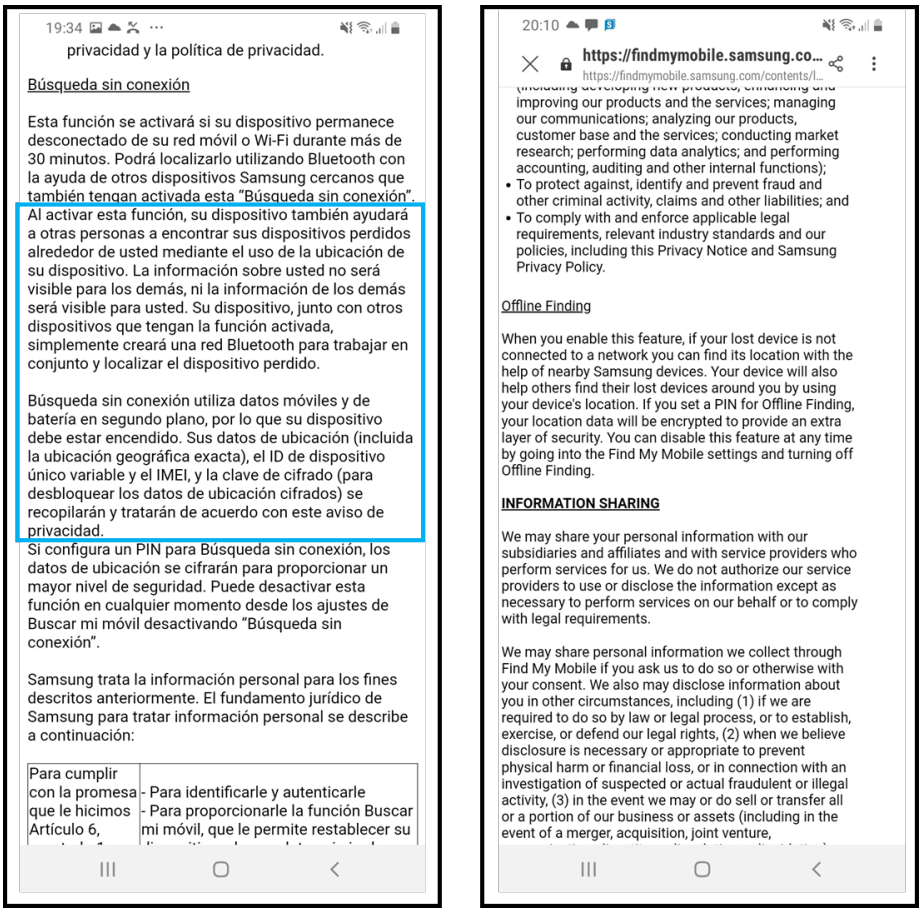


Figure 4: Offline Finding (*translated as "... When activating this function (i.e., offline finding) your device will also help to other people to find their lost devices around you though the usage of your device location. The information about you will not be visible for the others, neither the information of the others will be visible for you. Your device together with other devices with offline finding activated, will simply create a Bluetooth network to work jointly and locate the missing device. Offline finding uses mobile and battery background data, so your device must be switched on. Your location data (including the exact geographical location), the unique variable*

device ID and the IMEI, and the ciphering key (to unblock the ciphered location data) will be collected and managed according to this privacy advise…").

76. The Accused Products perform sending from the mobile station via a mobile telephone network an updating signal to one or more servers of a provider of presence related services about the mobile station's presence in the special area, the updating signal being useable by the one or more servers of the provider of presence related services to adjust an operating parameter, which comprises one or more of a tariff and a service flag, to adjust, activate, or deactivate the presence related services provided to the mobile station, and the updating signal comprising the information indicative of whether or not the radio communication defining device is located in the predetermined environment. For example, a helping mobile station (a *finder* device) identifies that it is present within the area of coverage of a device that is lost and is part of the Samsung Galaxy offline finding network and sends to a vendor controller server (i.e., to the Samsung Cloud servers in the case of Galaxy devices and Samsung offline finding ecosystem) an updating signal indicative of the presence status (the signal including the unique beacon data received from the lost device via BLE, together with the location of the device).

> In recent years, mobile device manufacturers such as Samsung and Apple have extended their lost-device tracking systems with an *offline finding* (OF) feature, which allows a lost mobile device to be found even when it does not have an internet connection. Both Apple and Samsung OF features share two key features: the use of Bluetooth Low Energy (BLE) for short range transmission of data between devices of a vendor, and crucially, an extensive network of (internet-connected) mobile devices (which we call *finder devices*) that relay location information to a vendor controlled server. We refer to the latter as the *OF network*. The basic idea is quite simple: when a (lost) device loses its internet connection, it starts broadcasting a unique beacon over BLE, which is then picked up by nearby finder devices participating in the OF network, who then forward the beacon and the location it is found to a vendor server.

Ex. 12, at 1-2, Introduction.

> When a registered device goes offline, it starts advertising a unique payload that identifies itself. This payload is picked up by nearby online (registered) devices which parse the payload extracting the device's identifier. The online device then accesses available location services to find out its own location. It then sends the lost device's identifier and the location through to Samsung. The owner of the lost device can then access the FMM web service to find out its location.

Ex. 12, at 7, § 3.2.

> The helper device then stops scanning and starts the location reporting process. Firstly, it accesses the SQL database to get the list of lost devices to report. Then the helper uses any available location services (GPS, Wi-Fi etc.) to pinpoint its own location and record it. The next process differs depending on whether the user has chosen to encrypt their location or not.
>
> - Unencrypted: The helper device creates a HTTPS request containing the lost device's private ID and its unencrypted latitude/longitude. The request is then sent to Samsung's location reporting server.
> - Encrypted: The helper device first contacts Samsung (over HTTPS) to receive a public key. Then it creates another HTTPS request containing the lost device's private ID and its latitude/longitude. The latitude/longitude are encrypted using an Elliptic Curve Integrated Encryption Scheme (ECIES) with the public key that was received from Samsung. The request is then sent to Samsung's location reporting server.

Ex. 12, at 9, § 3.2.3.

77. For example, the mobile station identifier of the helping mobile station is included within the updating signal sent to the Samsung Cloud.

> *Location report.* The received access token is present in each location report request to the server. Apart from information about the SmartTag and the access token, each location report contains an *id* field, generated as follows:
>
> $$id = androidId[0:4] \| SHA256(androidId \| \text{“}findMyMobile\text{”})$$
>
> where *androidId* denotes the Android Device ID of the helper device.[10]

Ex. 12, at 10, § 4.2.3.

78. For example, the updating signal is useable by the Samsung Cloud servers to adjust

a [lost/found] service flag operational parameter to “found” and to adjust/activate the presence related services provided to the helping mobile station, as services requestor (as elaborated herein below). The Samsung Cloud servers (Samsung is the provider of presence related services) receives the presence updating signal and uses it to provide presence related services. When a Find “offline finding” registered device related to a given SmartThings user´s account is missing a service flag operational parameter is set to “missing” in the Samsung Cloud such that the device is displayed as “disabled” within the SmartThings Find map, as illustrated in the image below in connection to a lost Galaxy A30 device. In that situation the user can wait for a mobile station that is part of the Galaxy Find network for offline finding to help in finding it. When the updating signal from the helping mobile station (comprising the location and the IMEI of the helping mobile station and the device identifier of the found device) is received in the Samsung Cloud it must adjust the referred service flag operational parameter to “found” (in connection to the mobile station finding it, and also in relation to the found device owner). The image below illustrates how the found device owner benefits from the visualization of an updated location within a SmartThings Find map, in connection to the device found by the helping mobile station (as a result of the activation (2) referred to above). If the device owner selected the “Notify me when it´s found” feature (see the first image below) then he/she will be notified when the missing device is found (as a result of the activation (3) referred to above).

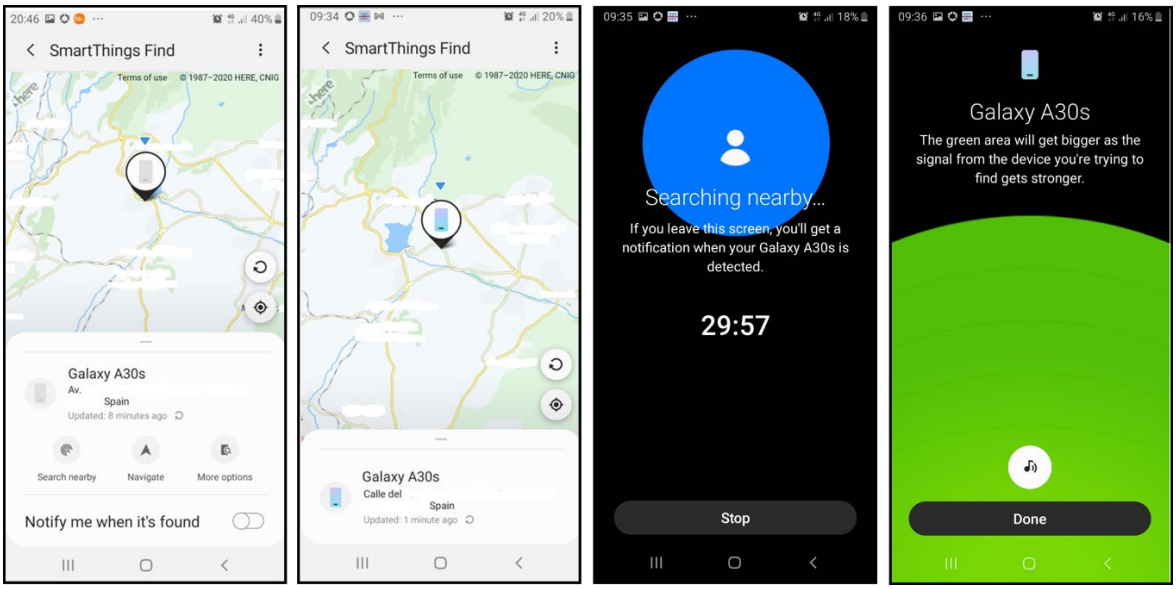


Figure 5: SmartThings Find

79. For example, when the user is nearby the found Samsung Galaxy A30s Device, he/she may enable the "search nearby" feature to facilitate the proximity searching of the device (as illustrated in the third and fourth images above). The following image further shows a Galaxy SmartTag located in a Find map thanks to offline finding (as a result of the activation (2) referred to above).

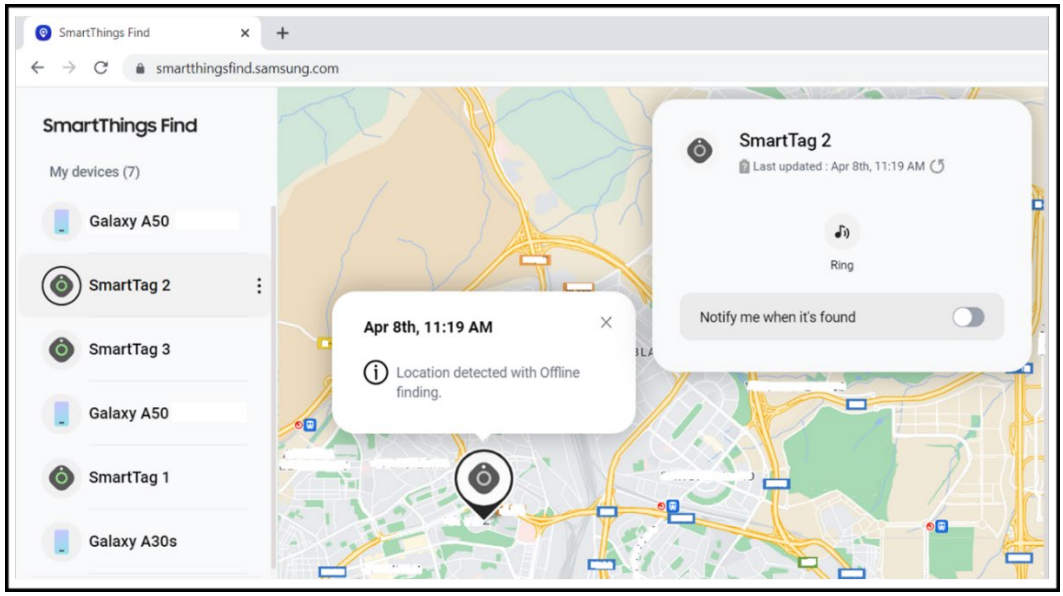


Figure 6: Galaxy SmartTag (available on https://smartthingsfind.samsung.com/ account)

80. For further example, when the Samsung Cloud servers adjusts the [lost/found] service flag operational parameter to "found" as detailed above, as a result of receiving the presence updating signal, the adjustment also serves to activate a presence related service related to the sending of an acknowledgment signal to the helping mobile station. As in the previous examples, the presence related service is provided to the helping mobile station as it is the entity triggering the updating signal, that is the service request. The acknowledgement presence related service is partly processed by the provider of presence related services, i.e., by the Samsung Cloud that generates the ack once the operation to update the device status to "found" has been successful, and partly processed by the helping mobile station, that receives the ack and set a 20 min delay for reporting any lost device it has already reported. For example, a 20 minute delay is set within the helping mobile station based upon the received indication from the Samsung Cloud that the "found" location report has been successful.

> The helper device then stops scanning and starts the location reporting process. Firstly, it accesses the SQL database to get the list of lost devices to report. Then the helper uses any available location services (GPS, Wi-Fi etc.) to pinpoint its own location and record it. The next process differs depending on whether the user has chosen to encrypt their location or not.
>
> - Unencrypted: The helper device creates a HTTPS request containing the lost device's private ID and its unencrypted latitude/longitude. The request is then sent to Samsung's location reporting server.
> - Encrypted: The helper device first contacts Samsung (over HTTPS) to receive a public key. Then it creates another HTTPS request containing the lost device's private ID and its latitude/longitude. The latitude/longitude are encrypted using an Elliptic Curve Integrated Encryption Scheme (ECIES) with the public key that was received from Samsung. The request is then sent to Samsung's location reporting server.
>
> In both cases, the helper device receives a response indicating the success of the operation and the lost device location reporting process finished. The helper device returns to scanning but with a timeout (20 mins) for reporting any lost devices it has already reported.

Ex. 12, at 9, § 3.2.3.

81. For example, the beneficiary of the presence related service is the helping mobile station, that can adapt the reporting process based upon the received acknowledgement. The updating signal is triggered as a result of the helping mobile station receiving the distinctive defining signal indicative that the lost device is in an offline status. Thus, the updating signal related to the offline finding service is, by its nature, indicative that the found device is in an offline status. The offline status is also inferred by the Samsung Cloud servers from the fact that the mobile station identifier (i.e., the IMEI within the received updating signal) and the identifier of the found device (also included in the received updating signal) do not relate to the same SmartThings account, which imply that the IMEI relates to the one of a helping mobile station and the found device is in an offline status. As elaborated above the offline status is indicative that the found

radio communication defining device is located in a predetermined environment (i.e., an environment that is outside the environment defined as the sum of the volumetric spaces wherein the BLE signal from the missing user´s device can be received in each of the other user´s Galaxy devices associated to the same user´s account).

82. Defendants have and continue to indirectly infringe one or more claims of the '720 Patent by inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the '720 Patent. Defendants induce this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. *See, e.g.*, Exhibit 14, available at https://www.samsung.com/us/smartthings/#get-started (instructions to "Let's get started with SmartThings"); *see also, e.g.,* Exhibit 15, available at https://www.samsung.com/us/support/downloads/?model=N0002100 (providing the product manuals for mobile devices including phones, tablets, wearables, audio, virtual reality, and other mobile accessories).

83. Because of Defendants' inducement, Defendants' customers and end-users use the Accused Products in a way Defendants intend and they directly infringe the '720 Patent. Defendants perform these affirmative acts with knowledge of the '720 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '720 Patent.

84. Defendants have indirectly infringed and continues to indirectly infringe one or

more claims of the ’720 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Defendants’ affirmative acts of selling and offering to sell the ’720 Accused Products in this District and elsewhere in the United States and causing the ’720 Accused Products to be manufactured, used, sold, and offered for sale contribute to others’ use and manufacture of the Accused Products, such that the ’720 Patent is directly infringed by others. The accused components within the Accused Products including, but not limited to, software manufactured by Defendants, are material to the invention of the ’720 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Defendants to be especially made or adapted for use in the infringement of the ’720 Patent. Defendants perform these affirmative acts with knowledge of the ’720 Patent and with intent, or willful blindness, that they cause the direct infringement of the ’720 Patent.

85. Because of Defendants’ direct and indirect infringement of the ’720 Patent, ALT has suffered damages in an amount to be proved at trial.

COUNT III
(Infringement of the ’910 Patent)

86. Paragraphs 1 through 27 are incorporated by reference as if fully set forth herein.

87. ALT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the ’910 Patent.

88. Defendants have and continue to directly infringe the claims of the ’910 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, at least by making, using, offering to sell, selling, and/or importing into the United States products and actively inducing others to make, use, sell, offer to sell, and/or import products, such as the Accused Products, that satisfy each and every limitation of one or more claims of the ’910

Patent, and by performing each and every limitation of one or more method claims of the ’910 Patent.

89. The Accused Products each comprise the system of at least claim 7 of the ’910 Patent: A mobile station capable of receiving first and second distinctive defining signals respectively from first and second radio communication defining devices, the first and second distinctive defining signals at least partly defining a special area by a sum or intersection of their coverage, the first and second distinctive defining signals respectively including first and second data, the mobile station comprising: an electronic storage medium that stores at least a portion of the first and second data; and a processor adapted to process the first and second distinctive defining signals to determine, based on at least portion of one or both of the first and second data, whether or not the mobile station is present in the special area, the processor further adapted to send from the mobile station via a mobile telephone network an updating signal to one or more servers of a provider of presence related services about the mobile station's presence in the special area, the sending of the updating signal being uncorrelated to any mobile station phone call establishment, the updating signal being sent at least one of (i) periodically, (ii) at times recent to when the mobile station enters into or exists from the special area, and (iii) when the mobile station remains in the special area.

90. The Accused Products comprise a mobile station capable of receiving first and second distinctive defining signals respectively from first and second radio communication defining devices, the first and second distinctive defining signals at least partly defining a special area by a sum or intersection of their coverage, the first and second distinctive defining signals respectively including first and second data. For example, Samsung SmartThings Find “offline finding” service implements a method associated with the use of a helping mobile station and at

least first and second Bluetooth radio communication defining devices that respectively transmit first and second Bluetooth distinctive defining signals that partly define an offline finding special area by a sum of their coverage. The first Bluetooth distinctive defining signal includes first data that includes an "offline finding service identifier". The second Bluetooth distinctive defining signal includes second data that also includes an "offline finding service identifier." The service identifier within the first data may be the same or different than the one within the second data. As an example, the first data may include an offline finding service identifier related to a lost mobile device (i.e., a service identifier with UUID "FD69", as detailed below), and the second data may include a different offline finding service identifier related to a lost smart tag (i.e., a service identifier with UID "FD5A", as detailed below). In more detail, within the Samsung Galaxy offline finding service a missing Bluetooth device that is part of the Samsung Galaxy Find network for offline finding (i.e., both the first and the second radio communication defining devices are part of the network) transmits a BLE distinctive defining signal indicating that it is in an offline status (i.e., it is lost). The helping mobile is capable to determine whether or not it is receiving an offline finding service distinctive defining signal that includes an offline finding service identifier.

> *A device is "offline" when it is disconnected from a mobile network, or in the case of Galaxy wearables, disconnected from your Galaxy smartphone.*

Ex. 9, available at https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

91. For example, within Samsung Find a user may register his/her Galaxy devices such that he/she may keep them located when they are nearby, by using the SmartThings mobile app. As illustrated below, Samsung Find also provides an "offline finding" mode wherein user´s lost Galaxy devices (smartphones, tablets, smartwatches, earbuds, smart tags) that are registered within the Galaxy Find network for offline finding can be found with the help of devices (e.g.,

smartphones) that processes received offline finding distinctive defining signals. The mobile station can be a Samsung Galaxy smartphone registered within SmartThings Find "offline finding" and helping to find missing Galaxy devices that are offline and are part of the Galaxy Find network. The missing Galaxy devices that are offline and are part of the Galaxy Find network for offline finding include the first and second radio communication defining devices, which transmit respectively the first and second distinctive defining signals.

If you lost your Galaxy phone, tablet, watch, or earbuds, you don't need to worry. The SmartThings Find feature allows you to lock, locate, or completely wipe your data. Even your Samsung Wallet payment information can be locked or erased, and all of this can be done remotely. There are also similar services available for your watch and earbuds within the Galaxy Wearable app.

Ex. 10, available at https://www.samsung.com/us/support/answer/ANS00080182/.

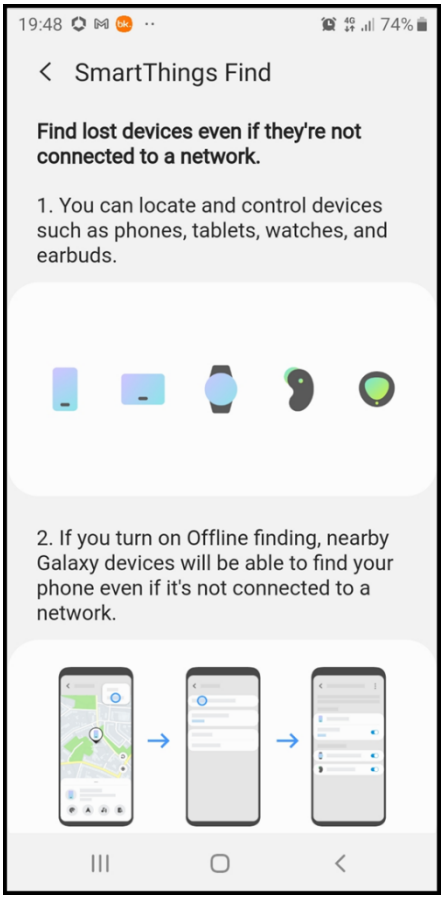


Figure 1: Smart Things mobile application, Tutorials

92. For example, if a Galaxy device that is part of the Galaxy Find network for offline finding (i.e., the first and second radio communication defining devices) has gone offline for 30

minutes, it starts emitting a Bluetooth Low Energy signal (i.e., a distinctive defining signal) that can then be picked up by any "helping" Samsung Galaxy smartphone or tablet that is part of the Find network for offline finding.

Offline Doesn't Mean "Off-the-Grid"

With the SmartThings Find service, you can easily locate your missing device even if it's offline.[7] That's because SmartThings users can now opt in to securely use their Galaxy smartphone or tablet to help others locate their lost devices. Once a device has been offline for 30 minutes, it produces a BLE signal that can be received by other devices. If you report your device as lost via SmartThings Find, any nearby Galaxy smartphone or tablet that has opted into helping find misplaced devices can alert the Samsung server about its location, which will in turn notify you. All SmartThings Find user data is encrypted and securely protected, ensuring that the device's location is not revealed to anyone except its owner.

Ex. 9, available at https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

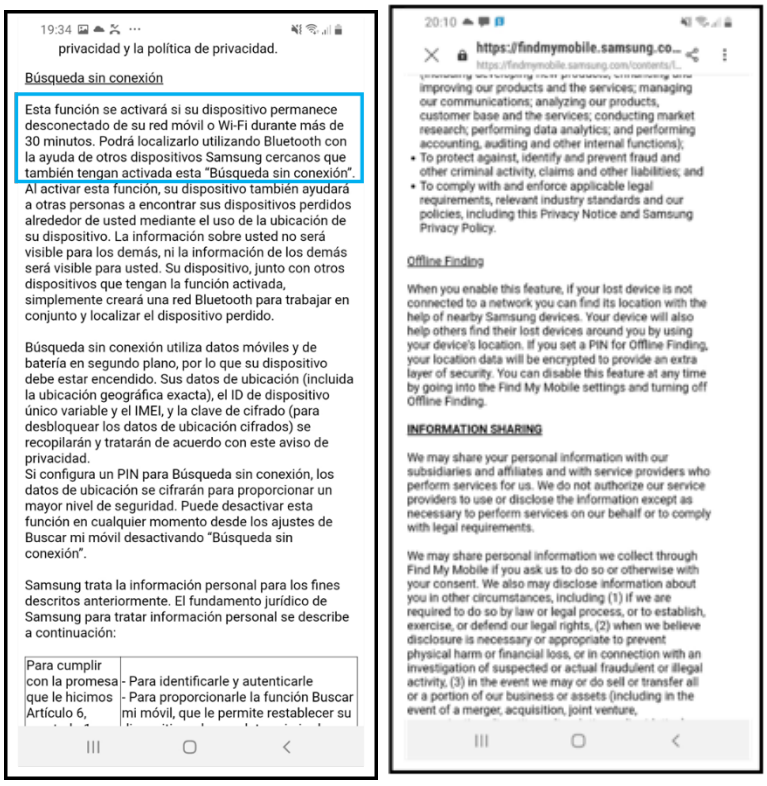


Figure 4: Offline Finding (translated as "The offline finding feature will activate if the device is disconnected from the mobile network or Wi-Fi for more than 30 minutes. It can be located using Bluetooth with the help of other nearby Samsung devices that also have "offline finding"

enabled.”).

93. For example, Samsung Galaxy offline finding service involves the use of a helping mobile station (a *finder* device) and BLE radio communication defining devices (lost devices) that transmits a BLE distinctive defining signal (a unique beacon).

> The OF protocol uses Bluetooth Low Energy (BLE) to broadcast a unique beacon for a lost device. This beacon is then picked up by nearby Samsung phones or tablets (the *finder* devices), which then forward the unique beacon, along with the location it was detected at, to a Samsung managed server. The owner of a lost device can then query the server to locate their device.

Ex. 12, at 1, Abstract. The Samsung Galaxy offline finding protocol has different modes of operation, depending on the type of device to be located (e.g., a lost mobile device or a lost smart tag in some examples below).

> The OF protocol has multiple modes of operations that depend on the functions supported by the devices involved as well as the type of device to be located.

Ex. 12, at 7, § 3.2.

94. For example, when the lost device is a mobile device, the lost mobile device advertises a signal indicative of the offline finding service (i.e., a signal with service identifier UUID: FD69). This signal is a Bluetooth distinctive defining signal transmitted by the radio communication defining device (i.e., transmitted by the lost Samsung Galaxy mobile station in this example). The distinctive defining signal also comprises an identifier of the lost device (i.e., the private ID).

> 3.2.2 *Offline (Lost) Device Operation.* When a OF registered device no longer has an active network connection, it enters 'Lost Mode' and triggers the Offline Finding service to start. The lost device then creates a GATT server profile and starts advertising on the main OF service UUID (FD69).
>
> *Lost Mode Advertising.* the lost mode advertisements are the fundamental part of the OF protocol. The lost device generates an advertisement containing a unique identifying payload (the private ID) which is picked up by a helper and reported to Samsung.
>
> Figure 2 describes the full advertisement payload is then generated using the current Private ID and two other bytes of information.

Byte 0	1	2	3	4	5	6	7	8	9	10	11	12	Byte 13
Operation mode / hop count	Private ID												Settings/ support info byte

Ex. 12, at 8, § 3.2.2.

95. For further example, when the lost device is a smart tag that is registered within Samsung offline finding, the lost smart tag advertises a signal indicative of the offline finding service (i.e., a signal with service identifier UUID: FD5A). This signal is a Bluetooth distinctive defining signal transmitted by the radio communication defining device (i.e., transmitted by the lost Samsung Galaxy smart tag in this example). The distinctive defining signal includes an identifier of the lost device (i.e., the private ID). The smart tag supports three different offline finding modes (only the *offline mode* and the *overmature offline mode* triggers the sending of a

presence updating signal to the Samsung Cloud).

> *BLE Advertisement.* A SmartTag broadcasts BLE data that any nearby online device can pick up. A non-registered tag broadcasts on UUID FD59, which allows an online device to discover its presence before the registration procedure. A registered tag broadcasts a 20-byte payload that follows a fixed structure on UUID FD5A, which allows the tag to participate in the OF network.

Ex. 12 at 10, § 4.2.4.

> *Advertisement Structure.* Figure 6 shows the advertisement structure of the OF data broadcasted by a SmartTag. Byte 0 stores the tag version, advertisement type, and tag state. Bytes 1-3 are the aging counter. Bytes 4-11 correspond to the first 8 bytes of a privacy ID selected from the privacy ID pool of the tag, which uniquely associates the tag with the Samsung account it is registered to.

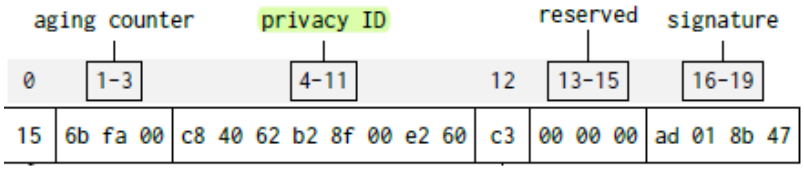


Figure 6: The OF Advertisement Structure for SmartTags

> **Tag State (Byte 0)** Bits 5-7 of Byte 0 in the OF data of SmartTags store the operating state of a tag. There are six different tag states

Bits 5-7	Name	Description
001 (1)	Premature Offline Mode	the tag has recently been disconnected
010 (2)	Offline Mode	the tag has remained disconnected for over 15 minutes
011 (3)	Overmature Offline Mode	the tag has stayed in Offline Mode for over 24 hours
100 (4)	Paired with one device	the tag is paired to a device
101 (5)	Connected to one device	the tag is connected to a device
110 (6)	Connected to two devices	the tag is connected to two devices

Table 12: Operating States of a SmartTag

> Helper devices in Samsung's OF network will only report locations of SmartTags in Offline or Overmature Offline mode.

> Helper devices in Samsung's OF network will only report locations of SmartTags in Offline or Overmature Offline mode.

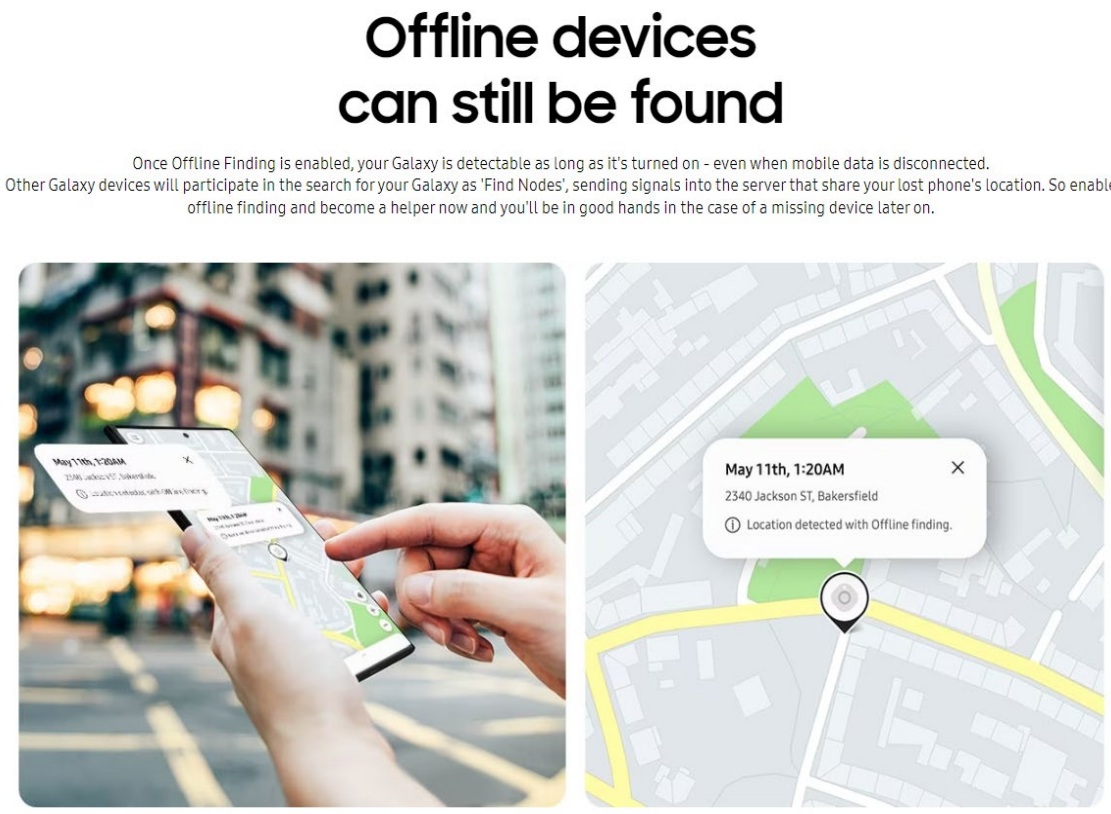
Ex. 12, at 16-17, § 4.5.1.

96. The Accused Products include an electronic storage medium that stores at least a portion of the first and second data; and a processor adapted to process the first and second distinctive defining signals to determine, based on at least portion of one or both of the first and second data, whether or not the mobile station is present in the special area. For example, if the first radio communication defining device is a lost mobile device it transmits the "FD69" offline finding service identifier within the first data of the first distinctive defining signal. If the first radio communication defining device is a lost smart tag it transmits the "FD5A" offline finding service identifier within the first data of the first distinctive defining signal. If the second radio communication defining device is a lost mobile device it transmits the "FD69" offline finding service identifier within the second data of the second distinctive defining signal. If the second radio communication defining device is a lost smart tag it transmits the "FD5A" offline finding service identifier within the second data of the second distinctive defining signal. The helping mobile station determines if it is receiving one or both of the first and second Bluetooth distinctive defining signals by using previously obtained at least portion of one or both of the first and second data (i.e., previously obtained "FD69" and "FD5A" offline finding service identifiers). If the helping mobile station receives an "offline finding service identifier" (FD69 or FD5A as referred above) from a first lost radio communication defining define (identified by its corresponding Private ID) then it determines that it is receiving a first distinctive defining signal (that partly defines the "offline finding" special area by its coverage).

Further, if the helping mobile station receives an "offline finding service identifier" (FD69 or FD5A) from a second lost radio communication defining define (identified by its corresponding Private ID) then it determines that it is receiving a second distinctive defining signal (that also partly defines the "offline finding" special area by its coverage). If the helping mobile station

determines that it is receiving either one or both of the first and second distinctive defining signals it consequently identifies that it is present within the "offline finding" special area. And each of the first and second distinctive defining signals partly defines the special area.

97. For further example, determining whether a received signal is a first/second distinctive defining signal is based on a previously obtained at least portion of the first/second data. Therefore, the presence determination is also based on the first and/or second data. Within SmartThings Find every Galaxy smartphone enabled for "offline finding" is converted into a receiver and locator to help search for missing devices. Any device registered within SmartThings Find for "offline finding" becomes a Find Node of the Find network and may receive and process the offline finding BLE defining signals from lost Galaxy devices.



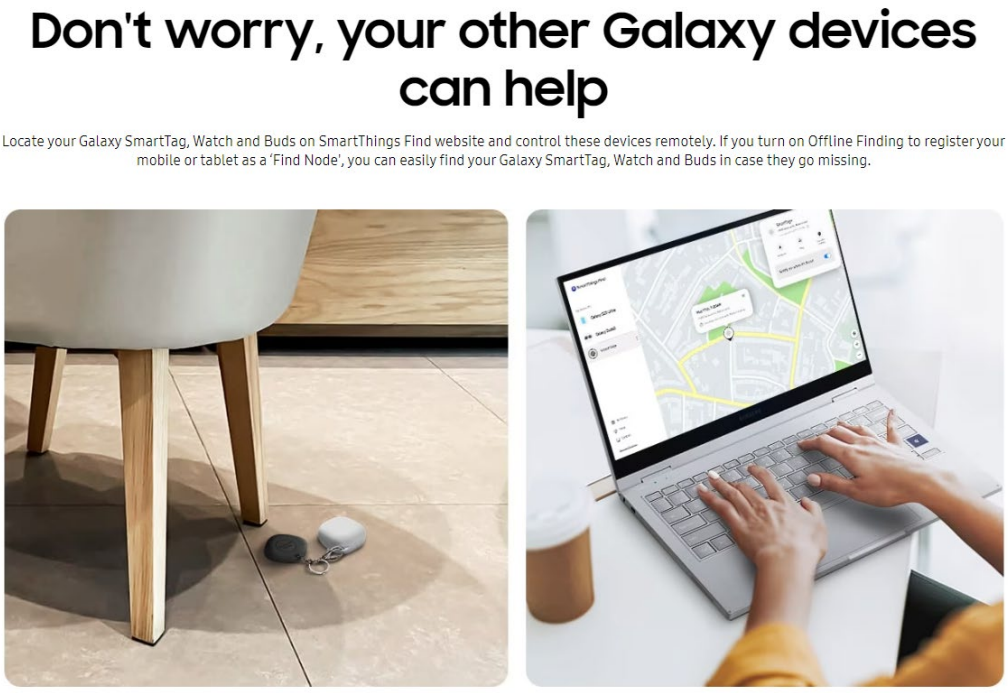


Exhibit 13, available at https://www.samsung.com/my/apps/smartthings-find/.

98. For further example, the special area can be defined as the area covered by the Bluetooth distinctive defining signals of all the radio communication defining devices that are part of the Galaxy Find network for offline finding and are in an offline status at a given time. Therefore, the special area is partly defined by a sum of the coverage of the first and the second Bluetooth distinctive defining signals from the first and second Bluetooth radio communication defining devices (that are part of the Galaxy Find network and are lost). A user can enroll Galaxy devices in the Galaxy Find network by using the SmartThings mobile app. In the first image below the user registers within Find, in connection to the user´s account, a Samsung Galaxy J6 ("this device") and a Galaxy A30. The user subsequently registers both devices for offline finding, as illustrated in the second image below. The user can locate the devices by using the Find map (third image below).

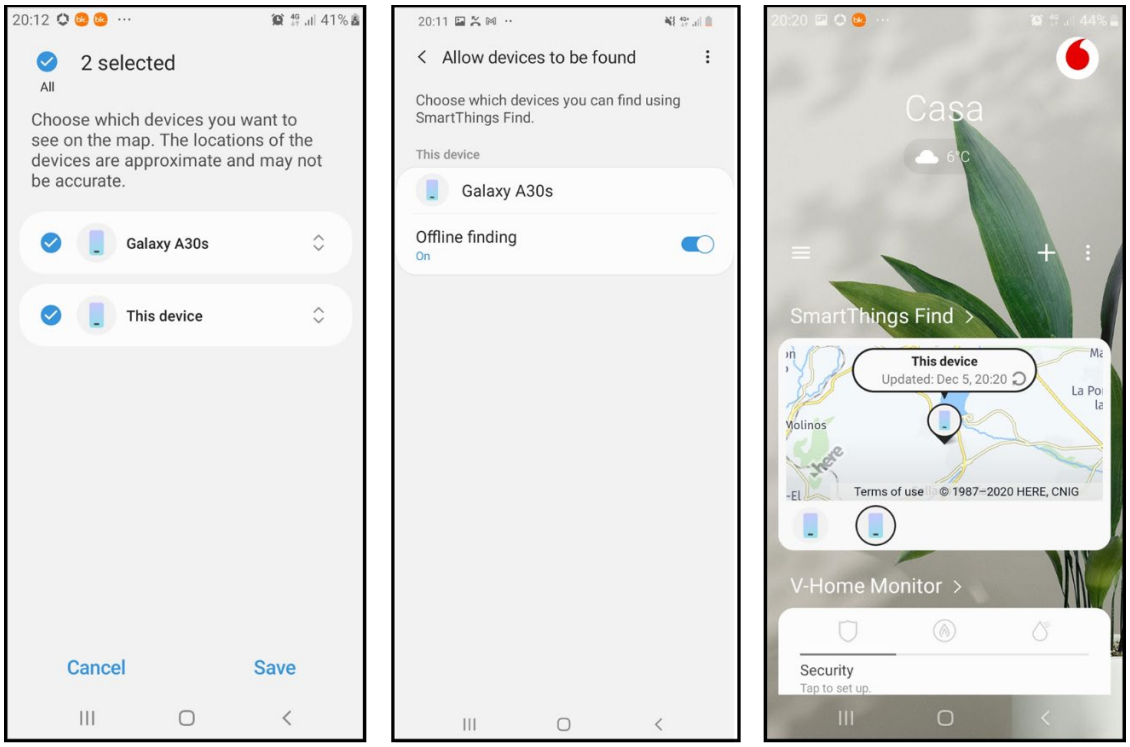


Figure 2: SmartThings mobile application, Register Device for Offline Finding

99. For example, when the lost device is a mobile device the result of the scan by the helping mobile station of advertisements with service identifier FD69 (i.e., the service identifier of the offline finding service for lost Galaxy mobile devices) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (i.e., the privacy ID) by processing the distinctive defining signal.

> *3.2.3 Online (Helper) Device Operation.* When a device with OF enabled is online, it periodically scans over BLE. This scan is performed with a scan filter that makes sure only advertisements with the OF service's UUID (FD69) are returned from the scan. If there are any lost mode devices nearby, the helper device picks up their advertisements and parses through the data to extract the lost device's private ID.

Ex. 12, at 9, § 3.2.3.

100. For example, the helping mobile station scans over BLE and is able to filter advertisements with service identifier FD69. To perform such filtering (i.e., to determine that a received signal is a distinctive defining signal with the FD69 service identifier) the mobile station must necessarily store data related to the FD69 service identifier (i.e., store previous obtained first/second data) and use the data to perform the filtering (i.e., the determination). When the lost device is a smart tag the result of the scan by the helping mobile station of advertisements with service identifier FD5A (i.e., the service identifier of the offline finding service for lost Galaxy smart tags) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (i.e., the privacy ID) by processing the distinctive defining signal.

> *4.5.1 Helper-Tag Interaction.* A registered tag broadcasts OF advertisements on UUID FD5A continuously. Any active Galaxy device with "FindMyMobile" (FMM) enabled is a helper device that participates in Samsung's OF network. A helper device regularly scans for BLE advertisement data from nearby SmartTags. It filters BLE advertisements based on the advertising UUID for SmartTags (FD5A).

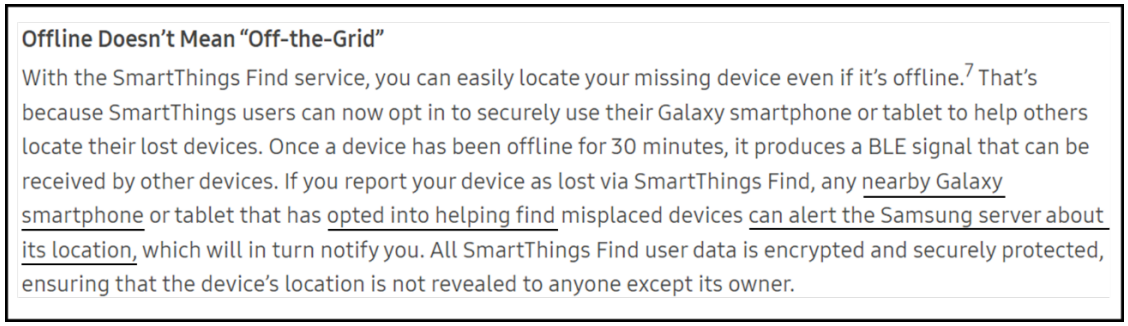
Ex. 12, at 16, § 4.5.1.

> *4.5.2 Helper-Server Interaction.* A Helper Device stores found lost SmartTags in a local database together with other lost FMM/FME devices discovered by the Helper. The database can store a maximum of 1000 devices using the privacy ID of the device as the key.
>
> The helper device will report geolocations of lost SmartTags in the database based on estimated locations received from the WiFi or GPS service.

Ex. 12, at 17, § 4.5.2.

101. For example, the helping mobile station scans over BLE and is able to filter advertisements with service identifier FD5A. To perform such filtering (i.e., to determine that a

received signal is a distinctive defining signal with the FD5A service identifier) the mobile station must necessarily store data related to the FD5A service identifier (i.e., store previous obtained first/second data) and use the data to perform the filtering (i.e., the determination). The helping mobile station sends via a mobile telephone network to the Samsung Cloud servers (Samsung is a provider of presence related services), a signal that identifies that the helping mobile station is nearby the first and/or the second lost radio communication defining device that is part of the Galaxy Find network (i.e., it is present in the special area). More in detail, when nearby the first and/or second lost radio communication defining device, the helping mobile station receives the first/second distinctive defining signal. The helping mobile station is able to identify that the received first/second signal is distinctive and to determine that it is present within the special area, as detailed above. The first/second BLE distinctive signal must include a device identifier such that the Galaxy Find services related to the first/second found device can be later provided in connection to that device, as elaborated below.



Offline Doesn't Mean "Off-the-Grid"

With the SmartThings Find service, you can easily locate your missing device even if it's offline.[7] That's because SmartThings users can now opt in to securely use their Galaxy smartphone or tablet to help others locate their lost devices. Once a device has been offline for 30 minutes, it produces a BLE signal that can be received by other devices. If you report your device as lost via SmartThings Find, any nearby Galaxy smartphone or tablet that has opted into helping find misplaced devices can alert the Samsung server about its location, which will in turn notify you. All SmartThings Find user data is encrypted and securely protected, ensuring that the device's location is not revealed to anyone except its owner.

Ex. 9, available at https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

102. The Accused Products include the processor further adapted to send from the mobile station via a mobile telephone network an updating signal to one or more servers of a provider of presence related services about the mobile station's presence in the special area, the sending of the updating signal being uncorrelated to any mobile station phone call establishment,

the updating signal being sent at least one of (i) periodically, (ii) at times recent to when the mobile station enters into or exists from the special area, and (iii) when the mobile station remains in the special area. For example, the mobile station sends a signal about the mobile station´s presence in the special area via a mobile telephone network to the Samsung Cloud servers (Samsung is the provider of Galaxy Find "offline finding" presence related services), the signal including the mobile station's location. When sending the presence updating signal, the helping mobile station is not necessarily within Wi-Fi coverage. In that case, the mobile station must send its updating signal via a mobile telephone network. The presence signal must also include the device identifier of the first and/or second found device, because the Galaxy Find network needs this to subsequently provide related presence related services (e.g., the notification to the device owner about the found device location). The first image below (in Spanish) indicates that once a helping mobile station has identified that it is nearby a lost device (i.e., the first and/or second radio communication defining device) that is in an offline status, the location and the IMEI of the helping mobile station and the corresponding device identifier of the lost device are collected and sent to the Galaxy Find service. (This information is sent to the Samsung Cloud servers within the updating signal; it is required to allow the device owner to locate the lost device).

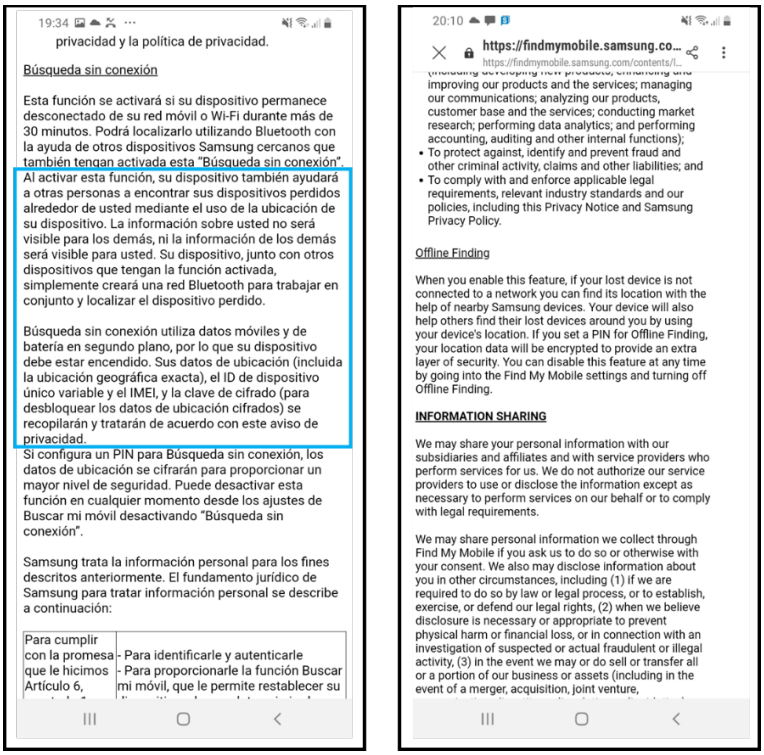


Figure 4 (translated as "… When activating this function (i.e., offline finding) your device will also help to other people to find their lost devices around you though the usage of your device location. The information about you will not be visible for the others, neither the information of the others will be visible for you. Your device together with other devices with offline finding activated, will simply create a Bluetooth network to work jointly and locate the missing device. Offline finding uses mobile and battery background data, so your device must be switched on. Your location data (including the exact geographical location), the unique variable device ID and the IMEI, and the ciphering key (to unblock the ciphered location data) will be collected and managed according to this privacy advise…").

103. For example, the Samsung Cloud servers (Samsung is the provider of presence related services) receives the presence updating signal and uses it to provide presence related services (e.g., displaying to the first "found" device's owner, the device's location on a map, as illustrated below in connection to a found smart tag (and similarly for the second found device);

or sending a notification to a device of the owner of the first or second lost device indicating that it has been found).

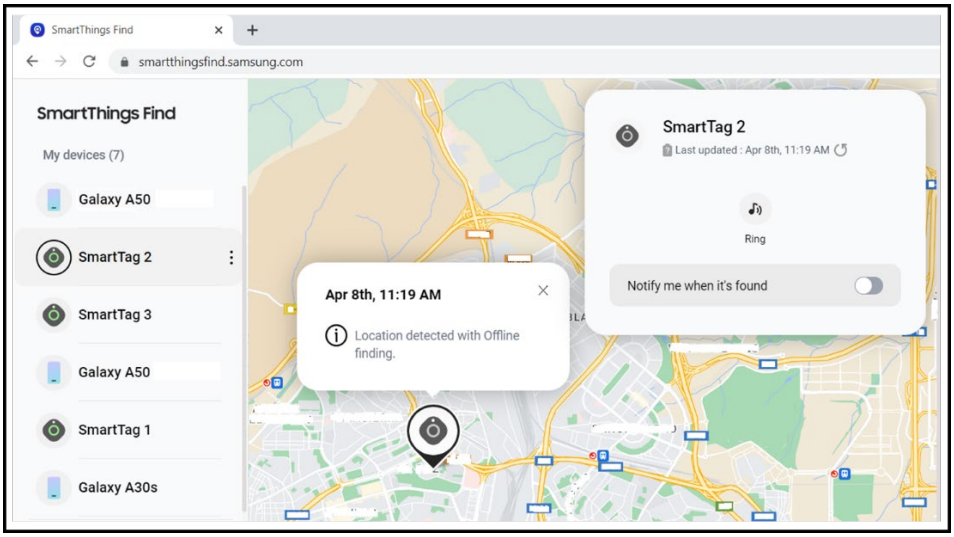


Figure 6: Galaxy SmartTag (available on https://smartthingsfind.samsung.com/ account)

104. For example, a helping mobile station (a *finder* device) identifies that it is present within the area of coverage of a device that is lost (e.g., the first and/or second radio communication defining device) and is part of the Samsung Galaxy offline finding network and sends to a vendor controller server (i.e., to the Samsung Cloud servers in the case of Galaxy devices and Samsung offline finding ecosystem) an updating signal indicating the presence status (the signal including unique beacon data received from the lost first/second device via BLE, together with the location of the device).

> In recent years, mobile device manufacturers such as Samsung and Apple have extended their lost-device tracking systems with an *offline finding* (OF) feature, which allows a lost mobile device to be found even when it does not have an internet connection. Both Apple and Samsung OF features share two key features: the use of Bluetooth Low Energy (BLE) for short range transmission of data between devices of a vendor, and crucially, an extensive network of (internet-connected) mobile devices (which we call *finder devices*) that relay location information to a vendor controlled server. We refer to the latter as the *OF network*. The basic idea is quite simple: when a (lost) device loses its internet connection, it starts broadcasting a unique beacon over BLE, which is then picked up by nearby finder devices participating in the OF network, who then forward the beacon and the location it is found to a vendor server.

Ex. 12 at 1, Introduction.

> An active finder device periodically scans for BLE advertisements from nearby FMM devices and reports the locations of those devices to a Samsung's server.

Ex. 12 at 2, Introduction.

> When a registered device goes offline, it starts advertising a unique payload that identifies itself. This payload is picked up by nearby online (registered) devices which parse the payload extracting the device's identifier. The online device then accesses available location services to find out its own location. It then sends the lost device's identifier and the location through to Samsung. The owner of the lost device can then access the FMM web service to find out its location.

Ex. 12 at 7, § 3.2.

105. The mobile station identifier of the helping mobile station is included within the updating signal sent to the Samsung Cloud.

> *Location report.* The received access token is present in each location report request to the server. Apart from information about the SmartTag and the access token, each location report contains an *id* field, generated as follows:
>
> $$id = androidId[0:4] \| SHA256(androidId \| \text{“}findMyMobile\text{”})$$
>
> where *androidId* denotes the Android Device ID of the helper device.[10]

Ex. 12 at 10, § 4.2.3

106. For example, the sending of the updating signal is uncorrelated to any mobile station phone call establishment. The updating signal is sent when the helping mobile station enters into the offline finding special area and starts receiving the first and/or second distinctive defining signals from the first/second lost radio communication defining device. Also, if the mobile station remains nearby the first and/or second lost device (i.e., remains in the special area) it periodically sends a presence updating signal via mobile telephone network to the Samsung Cloud servers, as further elaborated below. The helping mobile station stores in a local database the determination performed by the mobile station about its presence in the special area, in relation to each found device private ID identifier (i.e., in connection to at least the first and/or second radio communication defining devices). After storage, the helping mobile station sends a presence updating signal containing the (each) lost device private ID and the location to the Samsung Cloud servers. If it is the first (recent) reporting by the helping mobile station about its presence in the special area, the presence updating signal is then related to the mobile station entering into the special area.

3.2.3 *Online (Helper) Device Operation.* When a device with OF enabled is online, it periodically scans over BLE. This scan is performed with a scan filter that makes sure only advertisements with the OF service's UUID (FD69) are returned from the scan. If there are any lost mode devices nearby, the helper device picks up their advertisements and parses through the data to extract the lost device's private ID. To facilitate multiple lost devices nearby, each helper device maintains a local SQL database in which it adds any lost devices to.

The helper device then stops scanning and starts the location reporting process. Firstly, it accesses the SQL database to get the list of lost devices to report. Then the helper uses any available location services (GPS, Wi-Fi etc.) to pinpoint its own location and record it. The next process differs depending on whether the user has chosen to encrypt their location or not.

- Unencrypted: The helper device creates a HTTPS request containing the lost device's private ID and its unencrypted latitude/longitude. The request is then sent to Samsung's location reporting server.
- Encrypted: The helper device first contacts Samsung (over HTTPS) to receive a public key. Then it creates another HTTPS request containing the lost device's private ID and its latitude/longitude. The latitude/longitude are encrypted using an Elliptic Curve Integrated Encryption Scheme (ECIES) with the public key that was received from Samsung. The request is then sent to Samsung's location reporting server.

Ex. 12 at 9, § 3.2.3.

107. For example, the helping mobile station receives an acknowledgment about the presence updating signal having been received in the Samsung Cloud servers (via a mobile telephone network), as indicated in the image below. As also indicated in the image below, the presence determination process (i.e., the scanning and filtering of advertisements related to UUID FD69 service identifier) is then reinitiated. If the mobile station remains in the special area in connection to a lost device it has already reported (i.e., the first and/or second radio communication defining devices), then it may send (after 20 minutes) a new updating signal related to the mobile station presence in the special area (in connection to that lost device): i.e., the presence updating signal is then related to the mobile station remaining in the special area.

> In both cases, the helper device receives a response indicating the success of the operation and the lost device location reporting process finished. The helper device returns to scanning but with a timeout (20 mins) for reporting any lost devices it has already reported.

Ex. 12, at 9, § 3.2.3 (the lost device as a mobile device).

108. For example, the helping mobile station stores in a local database the determination performed by the mobile station about its presence in the special area, in connection to the (each) found device private ID identifier (e.g., in connection to at least the first and/or second radio communication defining devices). After the storage, the helping mobile station sends a presence updating signal containing the (up to 5) recently found device(s) private ID(s) and the location to the Samsung Cloud servers). If it is the first (recent) reporting by the helping mobile station about the mobile station presence in the special area, the presence updating signal is then related to the mobile station entering into the special area.

> *4.5.2 Helper-Server Interaction.* A Helper Device stores found lost SmartTags in a local database together with other lost FMM/FME devices discovered by the Helper. The database can store a maximum of 1000 devices using the privacy ID of the device as the key. A tag is marked as expired if it has not appeared in the BLE scanning for 15 minutes and will be removed from the database.
>
> The helper device will report geolocations of lost SmartTags in the database based on estimated locations received from the WiFi or GPS service. Each request is similar to the one made by the Owner Device to create an OF device profile (see §4.3.6), except that the URL is `/geolocations`, as a Helper Device does not know the `deviceId` of the lost tag. Each location report task allows a maximum of 5 recently found devices ($time_{found} \geq time_{current} - 1$ (minute)) from the local database to be reported.

Ex. 12, at 17, § 4.5.2 (showing the lost device as a smart tag).

109. Defendants have and continue to indirectly infringe one or more claims of the '910 Patent by inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users

directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the '910 Patent. Defendants induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. *See, e.g.*, Exhibit 14, available at https://www.samsung.com/us/smartthings/#get-started (instructions to "Let's get started with SmartThings"); *see also, e.g.,* Exhibit 15, available at https://www.samsung.com/us/support/downloads/?model=N0002100 (providing the product manuals for mobile devices including phones, tablets, wearables, audio, virtual reality, and other mobile accessories).

110. Because of Defendants' inducement, Defendants' customers and end-users use the Accused Products in a way Defendants intend and they directly infringe the '910 Patent. Defendants perform these affirmative acts with knowledge of the '910 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '910 Patent.

111. Defendants have indirectly infringed and continues to indirectly infringe one or more claims of the '910 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Defendants' affirmative acts of selling and offering to sell the '910 Accused Products in this District and elsewhere in the United States and causing the '910 Accused Products to be manufactured, used, sold, and offered for sale contribute to others' use and manufacture of the Accused Products, such that the '910 Patent is directly infringed by others. The accused components within the Accused Products including, but not limited to, software manufactured by

Defendants, are material to the invention of the '910 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Defendants to be especially made or adapted for use in the infringement of the '910 Patent. Defendants perform these affirmative acts with knowledge of the '910 Patent and with intent, or willful blindness, that they cause the direct infringement of the '910 Patent.

112. Because of Defendants' direct and indirect infringement of the '910 Patent, ALT has suffered damages in an amount to be proved at trial.

COUNT IV
(Infringement of the '922 Patent)

113. Paragraphs 1 through 27 are incorporated by reference as if fully set forth herein.

114. ALT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the '922 Patent.

115. Defendants have and continue to directly infringe the claims of the '922 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, at least by performing each and every limitation of one or more method claims of the '922 Patent.

116. The Accused Products practice the method of at least claim 1 of the '922 Patent: A method associated with one or more providers of presence related services in connection with the use of a mobile station and electronically storing in one or more memories data capable of linking the mobile station to the first and second special areas, the data including a first checking data of the first radio communication defining device, a second checking data of the second radio communication defining device, and a first identifier related to the mobile station, transmitting via a mobile telephone network to the mobile station at least a portion of the first checking data, and transmitting via the mobile telephone network to the mobile station at least a portion of the second

checking data, receiving from the mobile station via the mobile telephone network a first updating signal uncorrelated to any mobile station phone call establishment that identifies the mobile station's presence in at least the first special area, and receiving from the mobile station via the mobile telephone network a second updating signal uncorrelated to any mobile station phone call establishment that identifies the mobile station's presence in at least the second special area, the first updating signal including a second identifier related to the mobile station, the second updating signal including a third identifier related to the mobile station, deriving from the first updating signal by one or more processing devices having access to at least a portion of the data whether or not the mobile station is present in the first special area, and deriving from the second updating signal by the one or more processing devices whether or not the mobile station is present in the second special area; and enabling or disabling by use of the one or more processing devices a presence related service based upon the mobile station's presence or non-presence in the first special area, and enabling or disabling by use of the one or more processing devices a presence related service based upon the mobile station's presence or non-presence in the second special area.

117. The Accused Products perform a method associated with one or more providers of presence related services in connection with the use of a mobile station and at least a first radio communication defining device that transmits a first distinctive defining signal and a second radio communication defining device that transmits a second distinctive defining signal, the first distinctive defining signal at least partly defines a first special area by its coverage, the second distinctive defining signal at least partly defining a second special area by its coverage. For example, Samsung SmartThings Find implement a method associated with the use of a helping mobile station and a missing Bluetooth device that is part of the Samsung Galaxy Find network for offline finding and that transmits a distinctive defining signal indicative that it is in an offline

status (i.e., it is lost).

> *A device is "offline" when it is disconnected from a mobile network, or in the case of Galaxy wearables, disconnected from your Galaxy smartphone.*

Ex. 9, https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

118. For example, within Samsung Find a user may register his/her Galaxy devices such that he/she may keep them located when they are nearby, by using the SmartThings mobile app. As illustrated below, Samsung Find also provides an "offline finding" mode wherein user´s lost Galaxy devices (smartphones, tablets, smartwatches, earbuds, smart tags) that are registered within the Galaxy Find network for offline finding can be found with the help of devices (e.g., smartphones).

119. For further example, the mobile station is a Samsung Galaxy smartphone registered within SmartThings Find "offline finding" and helping to find a missing Galaxy device that is offline and is part of the Galaxy Find network. The missing Galaxy device that is offline and is part of the Galaxy Find network for offline finding is a radio communication defining device.

> If you lost your Galaxy phone, tablet, watch, or earbuds, you don't need to worry. The SmartThings Find feature allows you to lock, locate, or completely wipe your data. Even your Samsung Wallet payment information can be locked or erased, and all of this can be done remotely. There are also similar services available for your watch and earbuds within the Galaxy Wearable app.

Ex. 10, available at https://www.samsung.com/us/support/answer/ANS00080182/ .

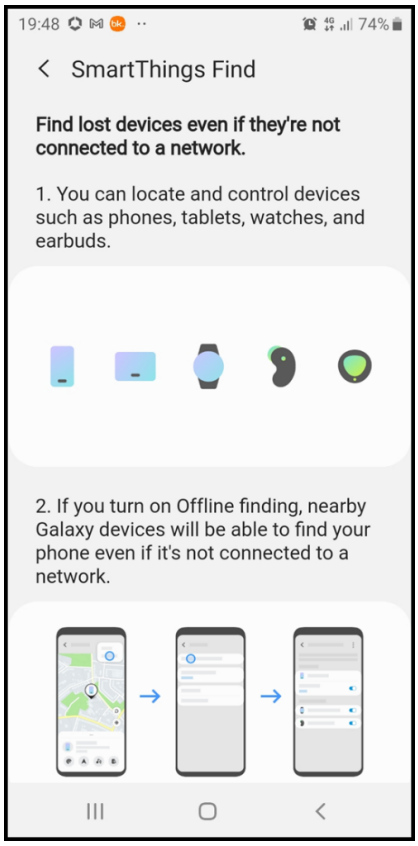


Figure 1: Smart Things mobile application, Tutorials

120. For example, if a Galaxy device that is part of the Galaxy Find network for offline finding (i.e., a radio communication defining device) has gone offline for 30 minutes, it starts emitting a Bluetooth Low Energy signal (i.e., a distinctive defining signal) that can then be picked up by any "helping" Samsung Galaxy smartphone or tablet that is part of the Find network for offline finding.

Offline Doesn't Mean "Off-the-Grid"

With the SmartThings Find service, you can easily locate your missing device even if it's offline.[7] That's because SmartThings users can now opt in to securely use their Galaxy smartphone or tablet to help others locate their lost devices. Once a device has been offline for 30 minutes, it produces a BLE signal that can be received by other devices. If you report your device as lost via SmartThings Find, any nearby Galaxy smartphone or tablet that has opted into helping find misplaced devices can alert the Samsung server about its location, which will in turn notify you. All SmartThings Find user data is encrypted and securely protected, ensuring that the device's location is not revealed to anyone except its owner.

Ex. 9, https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

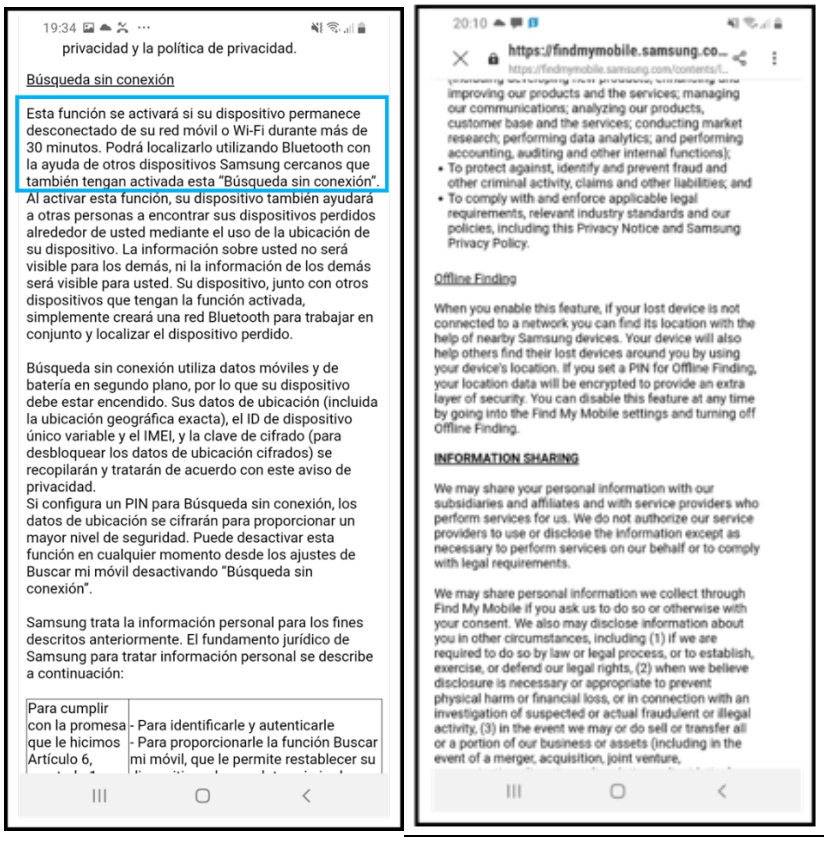


Figure 4: Offline Finding (translated as "The offline finding feature will activate if the device is disconnected from the mobile network or Wi-Fi for more than 30 minutes. It can be located using Bluetooth with the help of other nearby Samsung devices that also have "offline finding" enabled.").

121. For example, Samsung Galaxy offline finding service involves the use of a helping mobile station (a *finder* device) and a BLE radio communication defining device (a lost device) that transmits a BLE distinctive defining signal (a unique beacon).

> The OF protocol uses Bluetooth Low Energy (BLE) to broadcast a unique beacon for a lost device. This beacon is then picked up by nearby Samsung phones or tablets (the *finder* devices), which then forward the unique beacon, along with the location it was detected at, to a Samsung managed server. The owner of a lost device can then query the server to locate their device.

Ex. 12, at 1, Abstract.

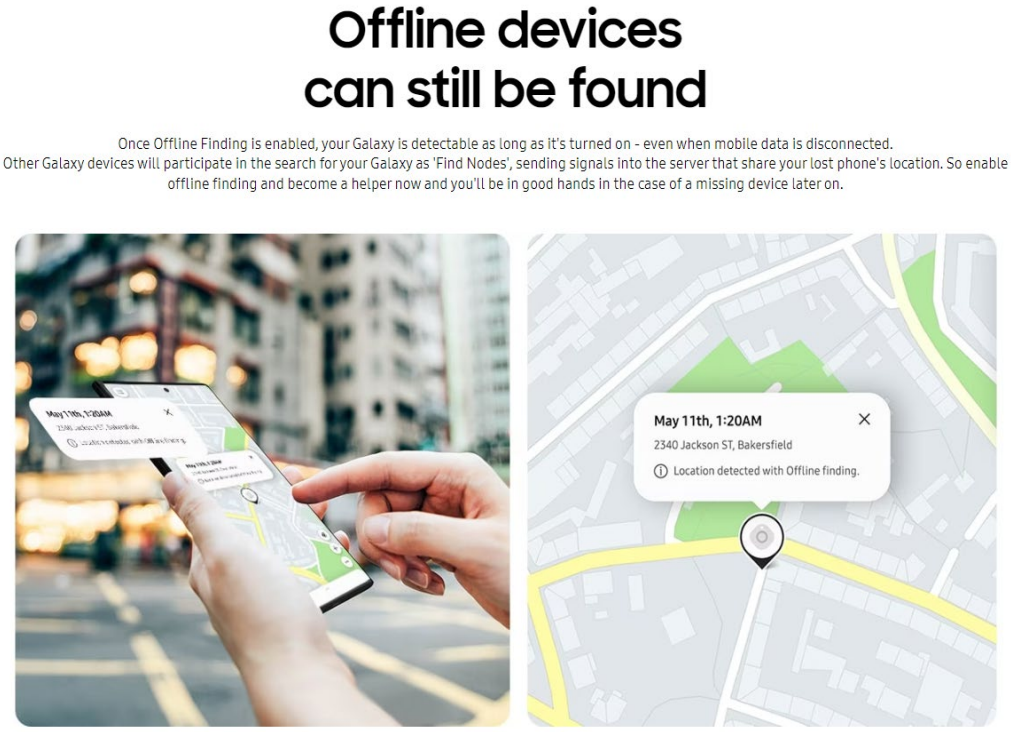
122. For further example, the Samsung Galaxy offline finding protocol has different modes of operation, depending on the type of device to be located (e.g., a lost mobile device or a lost smart tag in some examples below).

> The OF protocol has multiple modes of operations that depend on the functions supported by the devices involved as well as the type of device to be located.

Ex. 12, at 7, § 3.2.

123. The Accused Products perform electronically storing in one or more memories data capable of linking the mobile station to the first and second special areas, the data including a first checking data of the first radio communication defining device, a second checking data of the second radio communication defining device, and a first identifier related to the mobile station, transmitting via a mobile telephone network to the mobile station at least a portion of the first checking data, and transmitting via the mobile telephone network to the mobile station at least a portion of the second checking data. For example, the helping mobile station observes a channel corresponding to the offline finding service BLE signals transmission and process any received signal to determine whether or not it is receiving an offline finding service defining signal that comprises an offline finding service identifier. *See, e.g.*, in the case of a lost mobile device, the service identifier is the one with UUID: FD69; *see also, e.g.*, in the case of a lost smart tag, the service identifier is the one with UUID: FD5A. If the signal comprises an offline finding service identifier, at that point it is a defining signal for the helping mobile station. A processor within the helping mobile station processes any received defining signal and uses data previously stored in the mobile station (i.e., checking data), to determine whether or not the BLE defining signal received is a distinctive defining signal that at least partially defines the offline finding service special area. If the helping mobile station determines that it is receiving a distinctive defining

signal it consequently identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it, as detailed below). Within SmartThings Find every Galaxy smartphone enabled for "offline finding" is converted into a receiver and locator, which effectively crowdsources the search of a missing device. Any device registered within SmartThings Find for "offline finding" becomes a Find Node of the Find network and may receive and process the offline finding BLE defining signals from lost Galaxy devices.



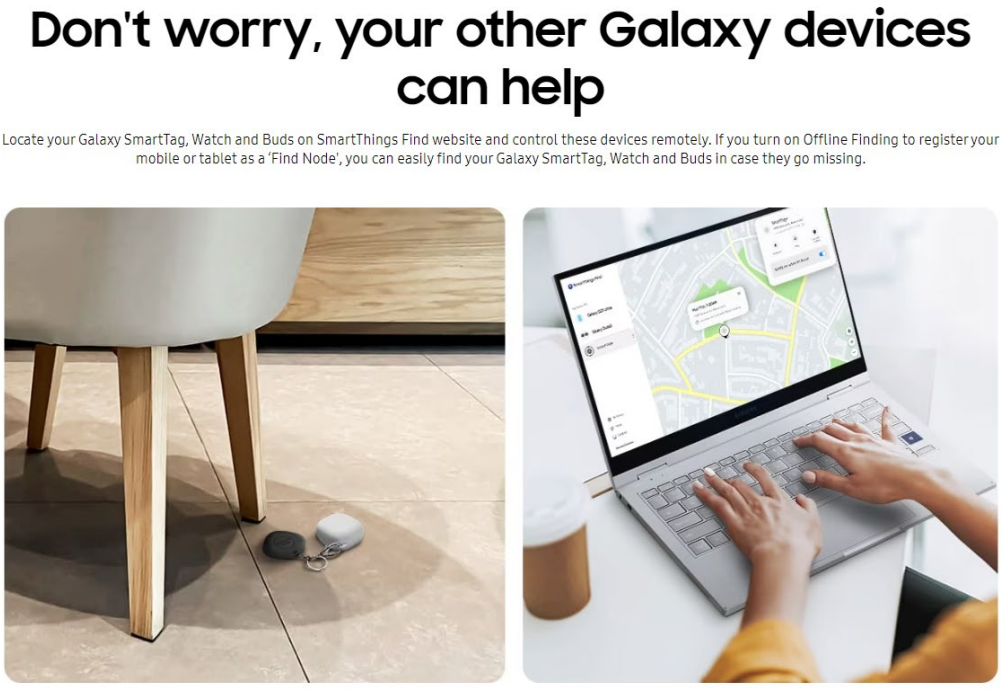


Exhibit 13, available at https://www.samsung.com/my/apps/smartthings-find/.

124. For example, the special area can be defined by the area covered by the Bluetooth distinctive defining signals of all the radio communication defining devices that are part of the Galaxy Find network for offline finding and are in an offline status at a given time. So, the special area is a dynamic-crowdsourced special area. The area covered by a given Bluetooth distinctive defining signal from a lost radio communication defining device that is in an offline status at least partly defines the special area. A user can make his/her Galaxy devices to join the Galaxy Find network by using the SmartThings mobile app. In the first image below the user registers within Find, in connection to the user´s account, a Samsung Galaxy J6 ("this device") and a Galaxy A30. The user subsequently registers both devices for offline finding, as illustrated in the second image below. The user can locate the devices by using the Find map (third image below).

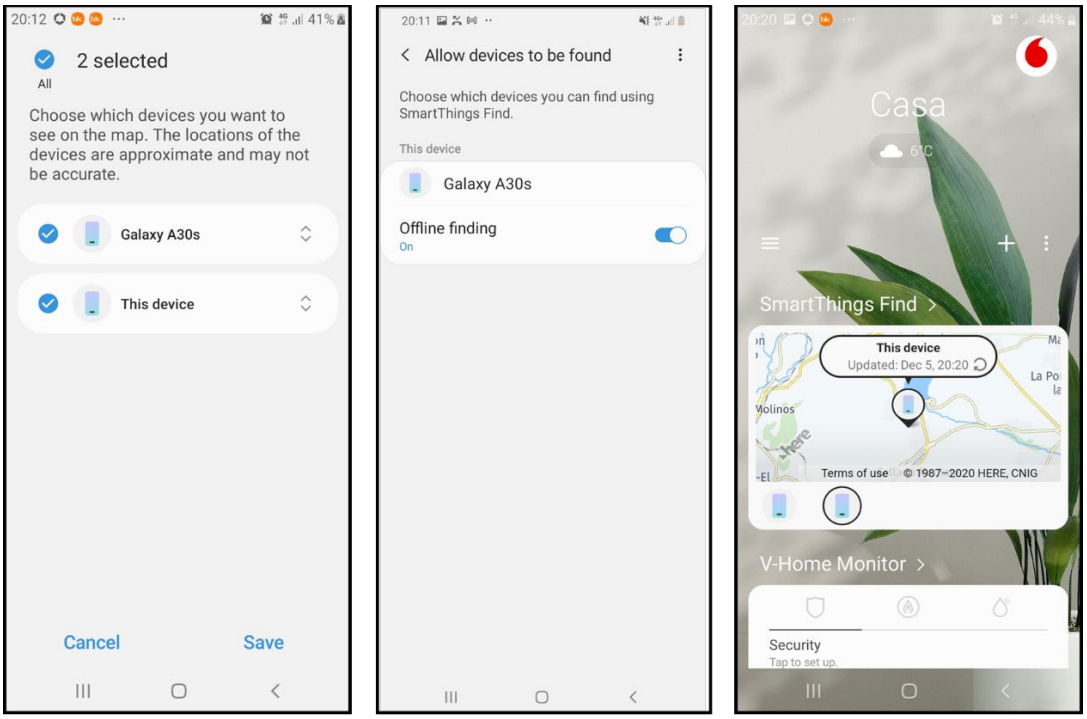


Figure 2: SmartThings mobile application, Register Device for Offline Finding

125. For example, a processor within the helps the mobile station in determining whether or not a received defining signal is a distinctive defining signal that at least party defines a special area and whether or not the mobile station is present in the offline finding service special area. When the lost device is a mobile device the result of the scan by the helping mobile station of advertisements with service identifier FD69 (*i.e.*, the service identifier of the offline finding service for lost Galaxy mobile devices) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (i.e., the privacy ID) by processing the distinctive defining signal.

> *3.2.3 Online (Helper) Device Operation.* When a device with OF enabled is online, it periodically scans over BLE. This scan is performed with a scan filter that makes sure only advertisements with the OF service's UUID (FD69) are returned from the scan. If there are any lost mode devices nearby, the helper device picks up their advertisements and parses through the data to extract the lost device's private ID.

Exhibit 12, at 9, § 3.2.3.

126. For example, the helping mobile station scans a BLE channel and is able to filter advertisements with service identifier FD69. To perform such filtering (*i.e.*, to determine that a defining signal with an offline finding service identifier is a distinctive defining signal with the FD69 service identifier) the mobile station must necessarily store data related to the FD69 service identifier (*i.e.*, store previous obtained checking data) and use the data to perform the filtering (*i.e.*, the determination). When the lost device is a smart tag the result of the scan by the helping mobile station of advertisements with service identifier FD5A (*i.e.*, the service identifier of the offline finding service for lost Galaxy smart tags) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (*i.e.*, the privacy ID) by processing the distinctive defining signal.

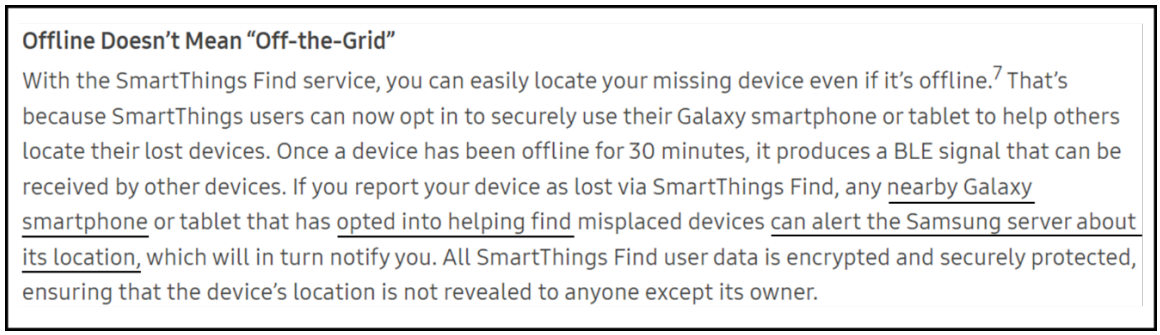
> *4.5.1 Helper-Tag Interaction.* A registered tag broadcasts OF advertisements on UUID FD5A continuously. Any active Galaxy device with "FindMyMobile" (FMM) enabled is a helper device that participates in Samsung's OF network. A helper device regularly scans for BLE advertisement data from nearby SmartTags. It filters BLE advertisements based on the advertising UUID for SmartTags (FD5A).

Exhibit 12, at 16, § 4.5.1.

> *4.5.2 Helper-Server Interaction.* A Helper Device stores found lost SmartTags in a local database together with other lost FMM/FME devices discovered by the Helper. The database can store a maximum of 1000 devices using the privacy ID of the device as the key.
>
> The helper device will report geolocations of lost SmartTags in the database based on estimated locations received from the WiFi or GPS service.

Exhibit 12, at 17, § 4.5.2.

127. For example, the helping mobile station scan a BLE channel and is able to filter advertisements with service identifier FD5A. To perform such filtering (*i.e.*, to determine that a defining signal with an offline finding service identifier is a distinctive defining signal with the FD5A service identifier) the mobile station must necessarily store data related to the FD5A service identifier (*i.e.*, store previous obtained checking data) and use the data to perform the filtering (*i.e.*, the determination). The helping mobile station sends to a mobile telephone network, and the mobile telephone network routes to the Samsung Cloud servers (Samsung is a provider of presence related services), a signal that identifies that the mobile station is nearby the missing device that is part of the Galaxy Find network (*i.e.*, it is present in the special area). Further, when nearby the lost radio communication defining device, the mobile station receives the distinctive defining signal. The helping mobile station is able to identify that the received defining signal is distinctive and to determine that it is present within the crowdsourced offline finding special area, as detailed above. The BLE distinctive signal must include a device identifier such that the Galaxy Find services related to the found device can be later provided in connection to that device, as elaborated below.



Offline Doesn't Mean "Off-the-Grid"

With the SmartThings Find service, you can easily locate your missing device even if it's offline.[7] That's because SmartThings users can now opt in to securely use their Galaxy smartphone or tablet to help others locate their lost devices. Once a device has been offline for 30 minutes, it produces a BLE signal that can be received by other devices. If you report your device as lost via SmartThings Find, any nearby Galaxy smartphone or tablet that has opted into helping find misplaced devices can alert the Samsung server about its location, which will in turn notify you. All SmartThings Find user data is encrypted and securely protected, ensuring that the device's location is not revealed to anyone except its owner.

Exhibit 9, available at https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices.

128. The Accused Products perform receiving from the mobile station via the mobile telephone network a first updating signal uncorrelated to any mobile station phone call establishment that identifies the mobile station's presence in at least the first special area, and receiving from the mobile station via the mobile telephone network a second updating signal uncorrelated to any mobile station phone call establishment that identifies the mobile station's presence in at least the second special area, the first updating signal including a second identifier related to the mobile station, the second updating signal including a third identifier related to the mobile station. For example, the mobile station sends a signal about the mobile station´s presence in the special area via a mobile telephone network to the Samsung Cloud servers (Samsung is the provider of Galaxy Find "offline finding" presence related services), the signal including the mobile station's location. When sending the presence updating signal, the helping mobile station is not necessarily within Wi-Fi coverage. In that case, the mobile station must send its updating signal via a mobile telephone network. The presence signal must also include the device identifier of the first and/or second found device, because the Galaxy Find network needs this to subsequently provide related presence related services (e.g., the notification to the device owner about the found device location). The first image below (in Spanish) indicates that once a helping mobile station has identified that it is nearby a lost device (i.e., the first and/or second radio

communication defining device) that is in an offline status, the location and the IMEI of the helping mobile station and the corresponding device identifier of the lost device are collected and sent to the Galaxy Find service. (This information is sent to the Samsung Cloud servers within the updating signal; it is required to allow the device owner to locate the lost device).

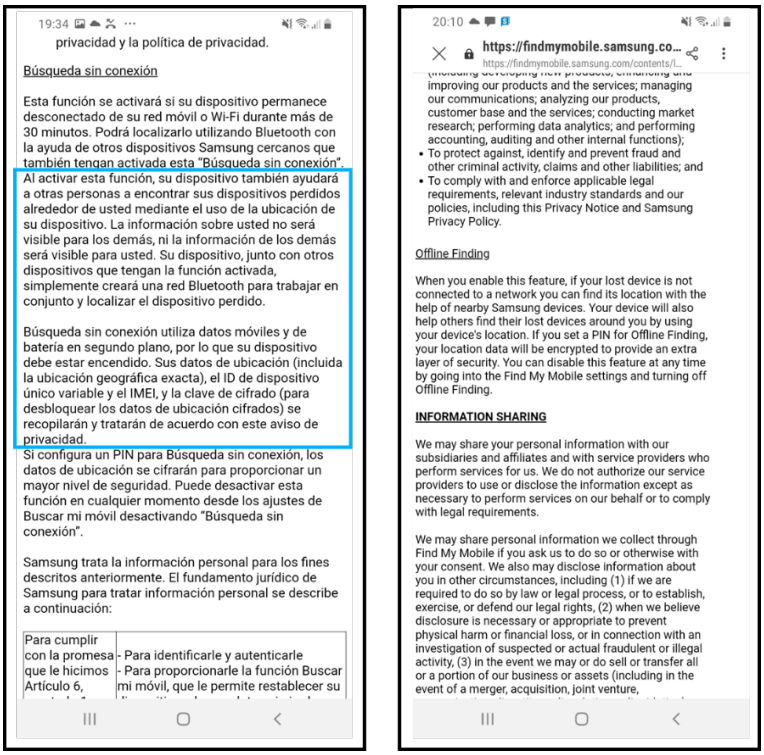


Figure 4 (translated as "… When activating this function (i.e., offline finding) your device will also help to other people to find their lost devices around you though the usage of your device location. The information about you will not be visible for the others, neither the information of the others will be visible for you. Your device together with other devices with offline finding activated, will simply create a Bluetooth network to work jointly and locate the missing device. Offline finding uses mobile and battery background data, so your device must be switched on. Your location data (including the exact geographical location), the unique variable device ID and the IMEI, and the ciphering key (to unblock the ciphered location data) will be collected and managed according to this privacy advise…").

129. The Accused Products perform enabling or disabling by use of the one or more processing devices a presence related service based upon the mobile station's presence or non-presence in the first special area, and enabling or disabling by use of the one or more processing devices a presence related service based upon the mobile station's presence or non-presence in the second special area. For example, the Samsung Cloud servers (Samsung is the provider of presence related services) receives the presence updating signal and uses it to provide presence related services (e.g., displaying to the first "found" device's owner, the device's location on a map, as illustrated below in connection to a found smart tag (and similarly for the second found device); or sending a notification to a device of the owner of the first or second lost device indicating that it has been found).

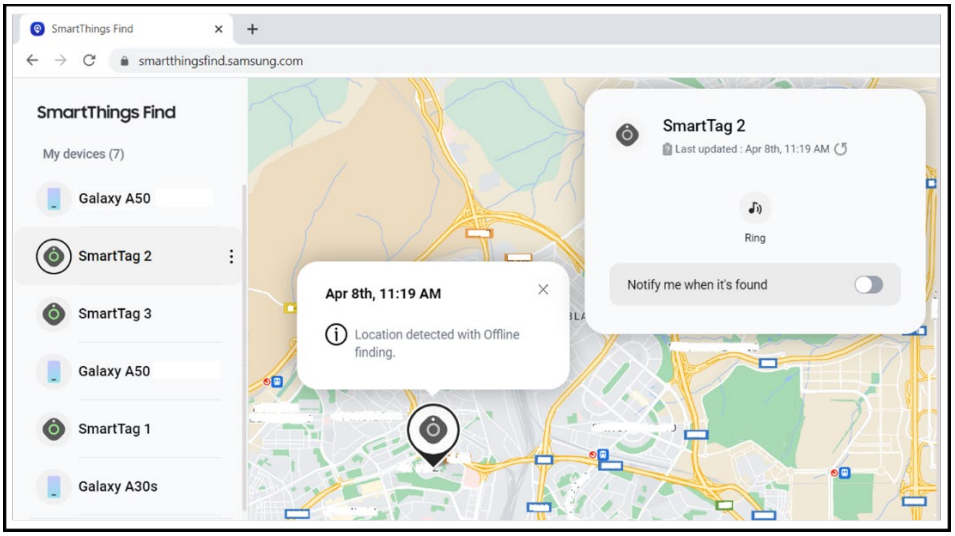


Figure 6: Galaxy SmartTag (available on https://smartthingsfind.samsung.com/ account)

130. The Accused Products perform deriving from the first updating signal by one or more processing devices having access to at least a portion of the data whether or not the mobile station is present in the first special area, and deriving from the second updating signal by the one or more processing devices whether or not the mobile station is present in the second special area. For example, a helping mobile station (a *finder* device) identifies that it is present within the area

of coverage of a device that is lost (e.g., the first and/or second radio communication defining device) and is part of the Samsung Galaxy offline finding network and sends to a vendor controller server (i.e., to the Samsung Cloud servers in the case of Galaxy devices and Samsung offline finding ecosystem) an updating signal indicating the presence status (the signal including unique beacon data received from the lost first/second device via BLE, together with the location of the device).

> In recent years, mobile device manufacturers such as Samsung and Apple have extended their lost-device tracking systems with an *offline finding* (OF) feature, which allows a lost mobile device to be found even when it does not have an internet connection. Both Apple and Samsung OF features share two key features: the use of Bluetooth Low Energy (BLE) for short range transmission of data between devices of a vendor, and crucially, an extensive network of (internet-connected) mobile devices (which we call *finder devices*) that relay location information to a vendor controlled server. We refer to the latter as the *OF network*. The basic idea is quite simple: when a (lost) device loses its internet connection, it starts broadcasting a unique beacon over BLE, which is then picked up by nearby finder devices participating in the OF network, who then forward the beacon and the location it is found to a vendor server.

Ex. 12 at 1, Introduction.

> An active finder device periodically scans for BLE advertisements from nearby FMM devices and reports the locations of those devices to a Samsung's server.

Ex. 12 at 2, Introduction.

> When a registered device goes offline, it starts advertising a unique payload that identifies itself. This payload is picked up by nearby online (registered) devices which parse the payload extracting the device's identifier. The online device then accesses available location services to find out its own location. It then sends the lost device's identifier and the location through to Samsung. The owner of the lost device can then access the FMM web service to find out its location.

Ex. 12 at 7, § 3.2.

131. The mobile station identifier of the helping mobile station is included within the

updating signal sent to the Samsung Cloud.

> *Location report*. The received access token is present in each location report request to the server. Apart from information about the SmartTag and the access token, each location report contains an *id* field, generated as follows:
>
> $$id = androidId[0:4] \| SHA256(androidId \| \text{“}findMyMobile\text{”})$$
>
> where *androidId* denotes the Android Device ID of the helper device.[10]

Ex. 12 at 10, § 4.2.3

132. For example, the sending of the updating signal is uncorrelated to any mobile station phone call establishment. The updating signal is sent when the helping mobile station enters into the offline finding special area and starts receiving the first and/or second distinctive defining signals from the first/second lost radio communication defining device. Also, if the mobile station remains nearby the first and/or second lost device (i.e., remains in the special area) it periodically sends a presence updating signal via mobile telephone network to the Samsung Cloud servers, as further elaborated below. The helping mobile station stores in a local database the determination performed by the mobile station about its presence in the special area, in relation to each found device private ID identifier (i.e., in connection to at least the first and/or second radio communication defining devices). After storage, the helping mobile station sends a presence updating signal containing the (each) lost device private ID and the location to the Samsung Cloud servers. If it is the first (recent) reporting by the helping mobile station about its presence in the special area, the presence updating signal is then related to the mobile station entering into the special area.

3.2.3 *Online (Helper) Device Operation.* When a device with OF enabled is online, it periodically scans over BLE. This scan is performed with a scan filter that makes sure only advertisements with the OF service's UUID (FD69) are returned from the scan. If there are any lost mode devices nearby, the helper device picks up their advertisements and parses through the data to extract the lost device's private ID. To facilitate multiple lost devices nearby, each helper device maintains a local SQL database in which it adds any lost devices to.

The helper device then stops scanning and starts the location reporting process. Firstly, it accesses the SQL database to get the list of lost devices to report. Then the helper uses any available location services (GPS, Wi-Fi etc.) to pinpoint its own location and record it. The next process differs depending on whether the user has chosen to encrypt their location or not.

- Unencrypted: The helper device creates a HTTPS request containing the lost device's private ID and its unencrypted latitude/longitude. The request is then sent to Samsung's location reporting server.
- Encrypted: The helper device first contacts Samsung (over HTTPS) to receive a public key. Then it creates another HTTPS request containing the lost device's private ID and its latitude/longitude. The latitude/longitude are encrypted using an Elliptic Curve Integrated Encryption Scheme (ECIES) with the public key that was received from Samsung. The request is then sent to Samsung's location reporting server.

Ex. 12 at 9, § 3.2.3.

133. For example, the helping mobile station receives an acknowledgment about the presence updating signal having been received in the Samsung Cloud servers (via a mobile telephone network), as indicated in the image below. As also indicated in the image below, the presence determination process (i.e., the scanning and filtering of advertisements related to UUID FD69 service identifier) is then reinitiated. If the mobile station remains in the special area in connection to a lost device it has already reported (i.e., the first and/or second radio communication defining devices), then it may send (after 20 minutes) a new updating signal (i.e., a second updating signal) related to the mobile station presence in the special area (in connection to that lost device): i.e., the presence updating signal is then related to the mobile station remaining in the special area.

> In both cases, the helper device receives a response indicating the success of the operation and the lost device location reporting process finished. The helper device returns to scanning but with a timeout (20 mins) for reporting any lost devices it has already reported.

Ex. 12, at 9, § 3.2.3 (the lost device as a mobile device).

134. For example, the helping mobile station stores in a local database the determination performed by the mobile station about its presence in the special area, in connection to the (each) found device private ID identifier (e.g., in connection to at least the first and/or second radio communication defining devices). After the storage, the helping mobile station sends a presence updating signal containing the (up to 5) recently found device(s) private ID(s) and the location to the Samsung Cloud servers). If it is the first (recent) reporting by the helping mobile station about the mobile station presence in the special area, the presence updating signal is then related to the mobile station entering into the special area.

> *4.5.2 Helper-Server Interaction.* A Helper Device stores found lost SmartTags in a local database together with other lost FMM/FME devices discovered by the Helper. The database can store a maximum of 1000 devices using the privacy ID of the device as the key. A tag is marked as expired if it has not appeared in the BLE scanning for 15 minutes and will be removed from the database.
>
> The helper device will report geolocations of lost SmartTags in the database based on estimated locations received from the WiFi or GPS service. Each request is similar to the one made by the Owner Device to create an OF device profile (see §4.3.6), except that the URL is `/geolocations`, as a Helper Device does not know the `deviceId` of the lost tag. Each location report task allows a maximum of 5 recently found devices ($time_{found} \geq time_{current} - 1$ (minute)) from the local database to be reported.

Ex. 12, at 17, § 4.5.2 (showing the lost device as a smart tag).

135. Defendants have and continue to indirectly infringe one or more claims of the '922 Patent by inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users

directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the '922 Patent. Defendants induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. *See, e.g.*, Exhibit 14, available at https://www.samsung.com/us/smartthings/#get-started (instructions to "Let's get started with SmartThings"); *see also, e.g.,* Exhibit 15, available at https://www.samsung.com/us/support/downloads/?model=N0002100 (providing the product manuals for mobile devices including phones, tablets, wearables, audio, virtual reality, and other mobile accessories).

136. Because of Defendants' inducement, Defendants' customers and end-users use the Accused Products in a way Defendants intend and they directly infringe the '922 Patent. Defendants perform these affirmative acts with knowledge of the '922 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '922 Patent.

137. Defendants have indirectly infringed and continues to indirectly infringe one or more claims of the '922 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Defendants' affirmative acts of selling and offering to sell the '922 Accused Products in this District and elsewhere in the United States and causing the '922 Accused Products to be manufactured, used, sold, and offered for sale contribute to others' use and manufacture of the Accused Products, such that the '922 Patent is directly infringed by others. The accused components within the Accused Products including, but not limited to, software manufactured by

Defendants, are material to the invention of the '922 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Defendants to be especially made or adapted for use in the infringement of the '922 Patent. Defendants perform these affirmative acts with knowledge of the '922 Patent and with intent, or willful blindness, that they cause the direct infringement of the '922 Patent.

138. Because of Defendants' direct and indirect infringement of the '922 Patent, ALT has suffered damages in an amount to be proved at trial.

COUNT V
(Infringement of the '030 Patent)

139. Paragraphs 1 through 27 are incorporated by reference as if fully set forth herein.

140. ALT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the '030 Patent.

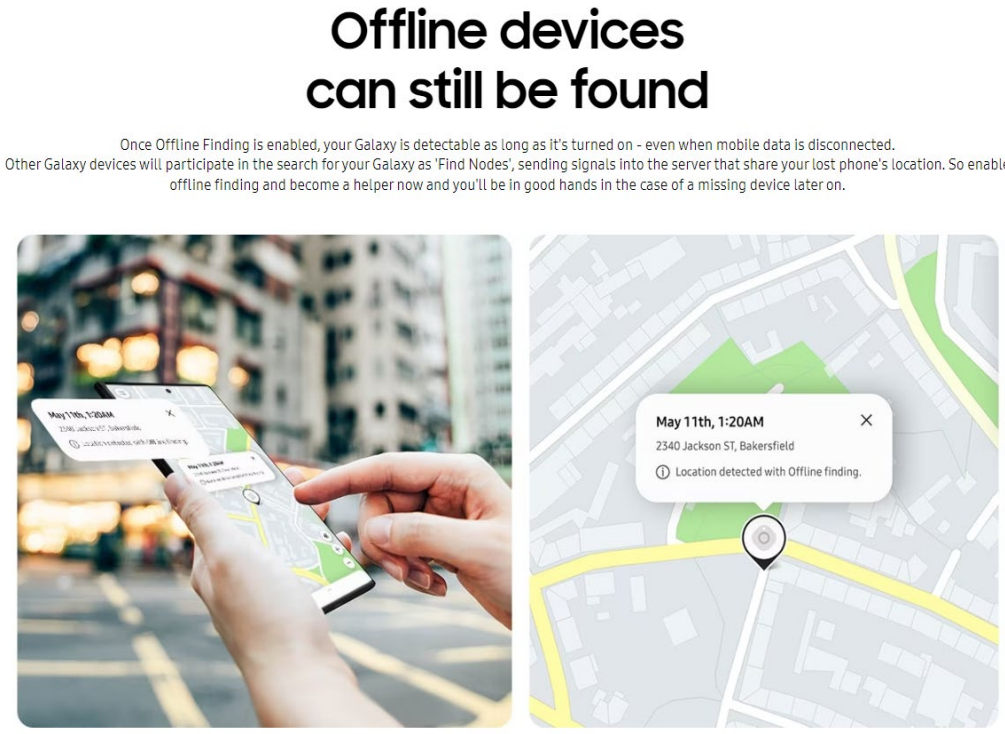
141. Defendants have and continue to directly infringe the claims of the '030 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, at least by performing each and every limitation of one or more method claims of the '030 Patent. .

142. The Accused Products practice the method of at least claim 1 of the '030 Patent: A method associated with a provider of presence related services in connection with the use of a mobile station and at least a first radio communication defining device that transmits a first distinctive defining signal, the first distinctive defining signal at least partly defines a first special area by its coverage, the method comprising: electronically storing in one or more memories data capable of linking the mobile station to the first special area, the data including a checking data of the first radio communication defining device and a first identifier related to the mobile station, transmitting via a mobile telephone network to the mobile station at least a portion of the checking

data, receiving from the mobile station via the mobile telephone network an updating signal uncorrelated to any mobile station phone call establishment that identifies the mobile station's presence in at least the first special area, the updating signal including a second identifier related to the mobile station, deriving from the updating signal by one or more processing devices having access to at least a portion of the data whether or not the mobile station is present in the first special area; and enabling or disabling by use of the one or more processing devices a presence related service based upon the mobile station's presence or non-presence in the first special area.

143. The Accused Products perform a method associated with a provider of presence related services in connection with the use of a mobile station and at least a first radio communication defining device that transmits a first distinctive defining signal, the first distinctive defining signal at least partly defines a first special area by its coverage, the method comprising electronically storing in one or more memories data capable of linking the mobile station to the first special area, the data including a checking data of the first radio communication defining device and a first identifier related to the mobile station, transmitting via a mobile telephone network to the mobile station at least a portion of the checking data. For example, the helping mobile station observes a channel corresponding to the offline finding service BLE signals transmission and process any received signal to determine whether or not it is receiving an offline finding service defining signal that comprises an offline finding service identifier. *See, e.g.*, in the case of a lost mobile device, the service identifier is the one with UUID: FD69; *see also, e.g.*, in the case of a lost smart tag, the service identifier is the one with UUID: FD5A. If the signal comprises an offline finding service identifier, at that point it is a defining signal for the helping mobile station. The helping mobile station processes any received defining signal and uses data previously stored in the mobile station (i.e., checking data), to determine whether or not the BLE

defining signal received is a distinctive defining signal that at least partially defines the offline finding service special area. If the helping mobile station determines that it is receiving a distinctive defining signal it consequently identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it, as detailed below). Within SmartThings Find every Galaxy smartphone enabled for "offline finding" is converted into a receiver and locator, which effectively crowdsources the search of a missing device. Any device registered within SmartThings Find for "offline finding" becomes a Find Node of the Find network and may receive and process the offline finding BLE defining signals from lost Galaxy devices.



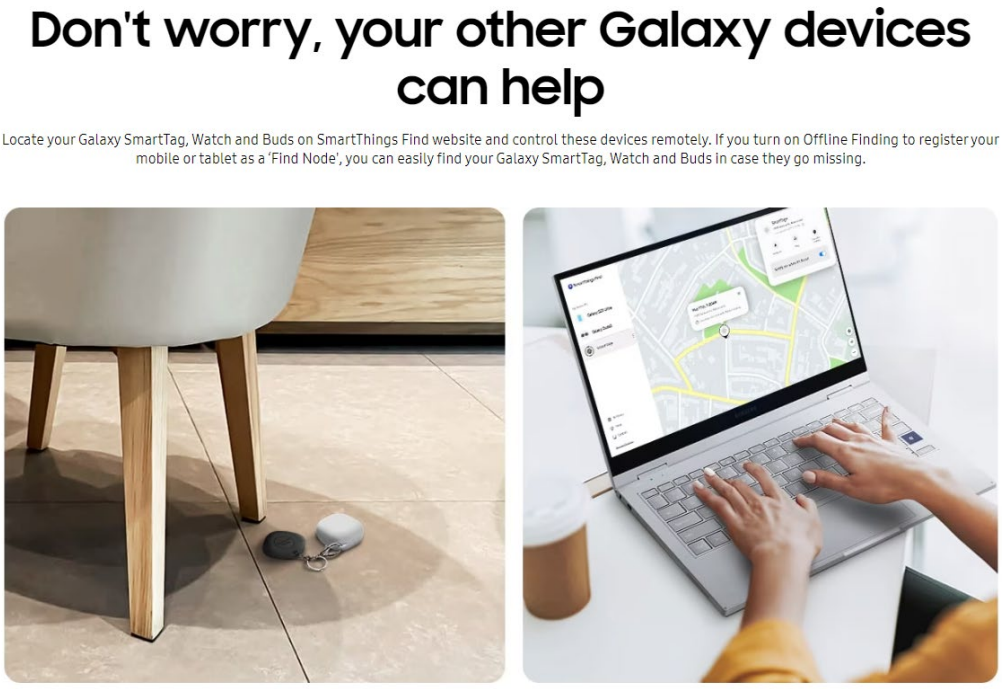


Exhibit 13, available at https://www.samsung.com/my/apps/smartthings-find/.

144. For example, the special area can be defined by the area covered by the Bluetooth distinctive defining signals of all the radio communication defining devices that are part of the Galaxy Find network for offline finding and are in an offline status at a given time. So, the special area is a dynamic-crowdsourced special area. The area covered by a given Bluetooth distinctive defining signal from a lost radio communication defining device that is in an offline status at least partly defines the special area. A user can make his/her Galaxy devices to join the Galaxy Find network by using the SmartThings mobile app. In the first image below the user registers within Find, in connection to the user´s account, a Samsung Galaxy J6 ("this device") and a Galaxy A30. The user subsequently registers both devices for offline finding, as illustrated in the second image below. The user can locate the devices by using the Find map (third image below).

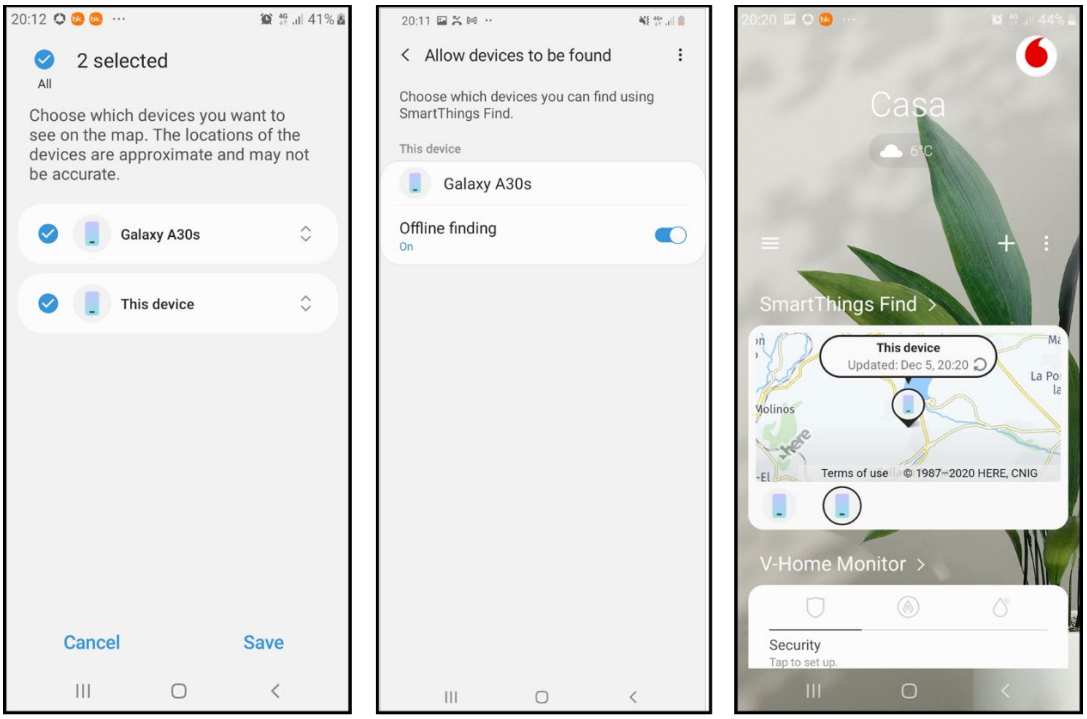


Figure 2: SmartThings mobile application, Register Device for Offline Finding

145. For example, a mobile device can help the mobile station in determining whether or not a received defining signal is a distinctive defining signal that at least party defines a special area and whether or not the mobile station is present in the offline finding service special area. When the lost device is a mobile device, the result of the scan by the helping mobile station of advertisements with service identifier FD69 (*i.e.*, the service identifier of the offline finding service for lost Galaxy mobile devices) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (i.e., the privacy ID) by processing the distinctive defining signal.

> *3.2.3 Online (Helper) Device Operation.* When a device with OF enabled is online, it periodically scans over BLE. This scan is performed with a scan filter that makes sure only advertisements with the OF service's UUID (FD69) are returned from the scan. If there are any lost mode devices nearby, the helper device picks up their advertisements and parses through the data to extract the lost device's private ID.

Exhibit 8, at 9, § 3.2.3.

146. For example, the helping mobile station scans a BLE channel and is able to filter advertisements with service identifier FD69. To perform such filtering (*i.e.*, to determine that a defining signal with an offline finding service identifier is a distinctive defining signal with the FD69 service identifier) the mobile station must necessarily store data related to the FD69 service identifier (*i.e.*, store previous obtained checking data) and use the data to perform the filtering. When the lost device is a smart tag the result of the scan by the helping mobile station of advertisements with service identifier FD5A (*i.e.*, the service identifier of the offline finding service for lost Galaxy smart tags) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (*i.e.*, the privacy ID) by processing the distinctive defining signal.

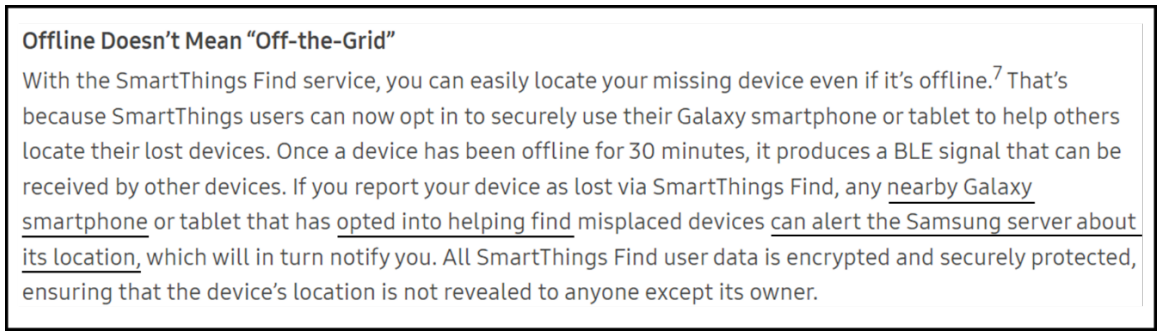
> *4.5.1 Helper-Tag Interaction.* A registered tag broadcasts OF advertisements on UUID FD5A continuously. Any active Galaxy device with "FindMyMobile" (FMM) enabled is a helper device that participates in Samsung's OF network. A helper device regularly scans for BLE advertisement data from nearby SmartTags. It filters BLE advertisements based on the advertising UUID for SmartTags (FD5A).

Exhibit 8, at 16, § 4.5.1.

> *4.5.2 Helper-Server Interaction.* A Helper Device stores found lost SmartTags in a local database together with other lost FMM/FME devices discovered by the Helper. The database can store a maximum of 1000 devices using the privacy ID of the device as the key.
>
> The helper device will report geolocations of lost SmartTags in the database based on estimated locations received from the WiFi or GPS service.

Exhibit 8, at 17, § 4.5.2.

147. For example, the helping mobile station scan a BLE channel and is able to filter advertisements with service identifier FD5A. To perform such filtering (*i.e.*, to determine that a defining signal with an offline finding service identifier is a distinctive defining signal with the FD5A service identifier) the mobile station must necessarily store data related to the FD5A service identifier (*i.e.*, store previous obtained checking data) and use the data to perform the filtering. The helping mobile station sends to a mobile telephone network, and the mobile telephone network routes to the Samsung Cloud servers (Samsung is a provider of presence related services), a signal that identifies that the mobile station is nearby the missing device that is part of the Galaxy Find network (*i.e.*, it is present in the special area). Further, when nearby the lost radio communication defining device, the mobile station receives the distinctive defining signal. The helping mobile station is able to identify that the received defining signal is distinctive and to determine that it is present within the crowdsourced offline finding special area, as detailed above. The BLE distinctive signal must include a device identifier such that the Galaxy Find services related to the found device can be later provided in connection to that device, as elaborated below.



Offline Doesn't Mean "Off-the-Grid"

With the SmartThings Find service, you can easily locate your missing device even if it's offline.[7] That's because SmartThings users can now opt in to securely use their Galaxy smartphone or tablet to help others locate their lost devices. Once a device has been offline for 30 minutes, it produces a BLE signal that can be received by other devices. If you report your device as lost via SmartThings Find, any nearby Galaxy smartphone or tablet that has opted into helping find misplaced devices can alert the Samsung server about its location, which will in turn notify you. All SmartThings Find user data is encrypted and securely protected, ensuring that the device's location is not revealed to anyone except its owner.

Exhibit 9, available at https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices.

148. The Accused Products perform receiving from the mobile station via the mobile telephone network an updating signal uncorrelated to any mobile station phone call establishment that identifies the mobile station's presence in at least the first special area, the updating signal including a second identifier related to the mobile station, deriving from the updating signal by one or more processing devices having access to at least a portion of the data whether or not the mobile station is present in the first special area; and enabling or disabling by use of the one or more processing devices a presence related service based upon the mobile station's presence or non-presence in the first special area. For example, the mobile station sends a signal about the mobile station´s presence in the special area via a mobile telephone network to the Samsung Cloud servers (Samsung is the provider of Galaxy Find "offline finding" presence related services), the signal including the mobile station's location. When sending the presence updating signal, the helping mobile station is not necessarily within Wi-Fi coverage. In that case, the mobile station must send its updating signal via a mobile telephone network. The presence signal must also include the device identifier of the first and/or second found device, because the Galaxy Find network needs this to subsequently provide related presence related services (e.g., the notification to the device owner about the found device location). The first image below (in Spanish) indicates that once a helping mobile station has identified that it is nearby a lost device (i.e., the first and/or

second radio communication defining device) that is in an offline status, the location and the IMEI of the helping mobile station and the corresponding device identifier of the lost device are collected and sent to the Galaxy Find service. (This information is sent to the Samsung Cloud servers within the updating signal; it is required to allow the device owner to locate the lost device).

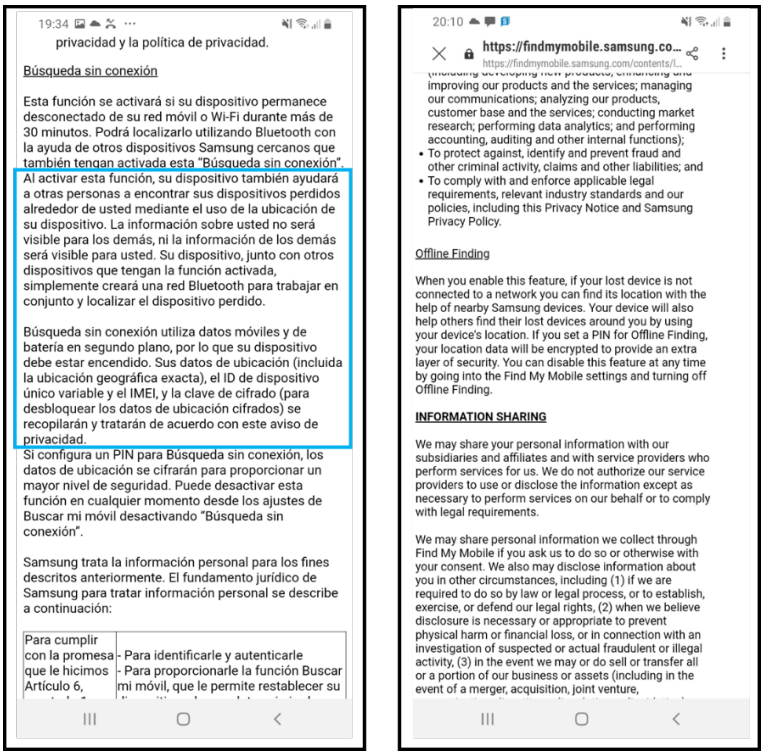


Figure 4 (translated as "… When activating this function (i.e., offline finding) your device will also help to other people to find their lost devices around you though the usage of your device location. The information about you will not be visible for the others, neither the information of the others will be visible for you. Your device together with other devices with offline finding activated, will simply create a Bluetooth network to work jointly and locate the missing device. Offline finding uses mobile and battery background data, so your device must be switched on. Your location data (including the exact geographical location), the unique variable device ID and the IMEI, and the ciphering key (to unblock the ciphered location data) will be collected and managed according to this privacy advise…").

149. For example, the Samsung Cloud servers (Samsung is the provider of presence related services) receives the presence updating signal and uses it to provide presence related services (e.g., displaying to the first "found" device's owner, the device's location on a map, as illustrated below in connection to a found smart tag (and similarly for the second found device); or sending a notification to a device of the owner of the first or second lost device indicating that it has been found) (i.e., enabling or disabling…a presence related service based upon the mobile station's presence or non-presence in the first special area).

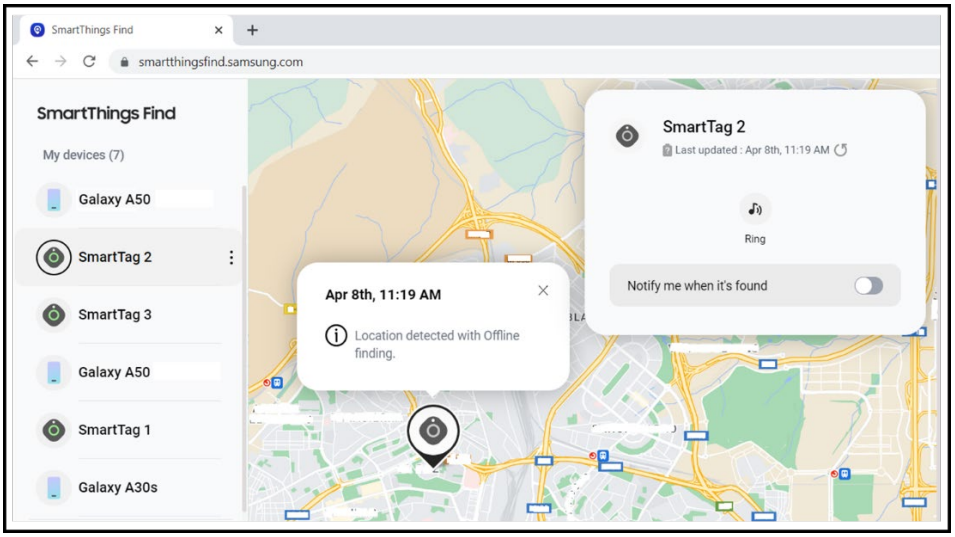


Figure 6: Galaxy SmartTag (available on https://smartthingsfind.samsung.com/ account)

150. For example, a helping mobile station (a *finder* device) identifies that it is present within the area of coverage of a device that is lost (e.g., the first and/or second radio communication defining device) and is part of the Samsung Galaxy offline finding network and sends to a vendor controller server (i.e., to the Samsung Cloud servers in the case of Galaxy devices and Samsung offline finding ecosystem) an updating signal indicating the presence status (the signal including unique beacon data received from the lost first/second device via BLE, together with the location of the device).

> In recent years, mobile device manufacturers such as Samsung and Apple have extended their lost-device tracking systems with an *offline finding* (OF) feature, which allows a lost mobile device to be found even when it does not have an internet connection. Both Apple and Samsung OF features share two key features: the use of Bluetooth Low Energy (BLE) for short range transmission of data between devices of a vendor, and crucially, an extensive network of (internet-connected) mobile devices (which we call *finder devices*) that relay location information to a vendor controlled server. We refer to the latter as the *OF network*. The basic idea is quite simple: when a (lost) device loses its internet connection, it starts broadcasting a unique beacon over BLE, which is then picked up by nearby finder devices participating in the OF network, who then forward the beacon and the location it is found to a vendor server.

Ex. 12 at 1, Introduction.

> An active finder device periodically scans for BLE advertisements from nearby FMM devices and reports the locations of those devices to a Samsung's server.

Ex. 12 at 2, Introduction.

> When a registered device goes offline, it starts advertising a unique payload that identifies itself. This payload is picked up by nearby online (registered) devices which parse the payload extracting the device's identifier. The online device then accesses available location services to find out its own location. It then sends the lost device's identifier and the location through to Samsung. The owner of the lost device can then access the FMM web service to find out its location.

Ex. 12 at 7, § 3.2.

151. The mobile station identifier of the helping mobile station is included within the updating signal sent to the Samsung Cloud.

> *Location report.* The received access token is present in each location report request to the server. Apart from information about the SmartTag and the access token, each location report contains an *id* field, generated as follows:
>
> $$id = androidId[0:4] \| SHA256(androidId \| \text{“}findMyMobile\text{”})$$
>
> where *androidId* denotes the Android Device ID of the helper device.[10]

Ex. 12 at 10, § 4.2.3

152. For example, the sending of the updating signal is uncorrelated to any mobile station phone call establishment. The updating signal is sent when the helping mobile station enters into the offline finding special area and starts receiving the first and/or second distinctive defining signals from the first/second lost radio communication defining device. Also, if the mobile station remains nearby the first and/or second lost device (i.e., remains in the special area) it periodically sends a presence updating signal via mobile telephone network to the Samsung Cloud servers, as further elaborated below. The helping mobile station stores in a local database the determination performed by the mobile station about its presence in the special area, in relation to each found device private ID identifier (i.e., in connection to at least the first and/or second radio communication defining devices). After storage, the helping mobile station sends a presence updating signal containing the (each) lost device private ID and the location to the Samsung Cloud servers. If it is the first (recent) reporting by the helping mobile station about its presence in the special area, the presence updating signal is then related to the mobile station entering into the special area.

> 3.2.3 *Online (Helper) Device Operation.* When a device with OF enabled is online, it periodically scans over BLE. This scan is performed with a scan filter that makes sure only advertisements with the OF service's UUID (FD69) are returned from the scan. If there are any lost mode devices nearby, the helper device picks up their advertisements and parses through the data to extract the lost device's private ID. To facilitate multiple lost devices nearby, each helper device maintains a local SQL database in which it adds any lost devices to.
>
> The helper device then stops scanning and starts the location reporting process. Firstly, it accesses the SQL database to get the list of lost devices to report. Then the helper uses any available location services (GPS, Wi-Fi etc.) to pinpoint its own location and record it. The next process differs depending on whether the user has chosen to encrypt their location or not.
>
> - Unencrypted: The helper device creates a HTTPS request containing the lost device's private ID and its unencrypted latitude/longitude. The request is then sent to Samsung's location reporting server.
> - Encrypted: The helper device first contacts Samsung (over HTTPS) to receive a public key. Then it creates another HTTPS request containing the lost device's private ID and its latitude/longitude. The latitude/longitude are encrypted using an Elliptic Curve Integrated Encryption Scheme (ECIES) with the public key that was received from Samsung. The request is then sent to Samsung's location reporting server.

Ex. 12 at 9, § 3.2.3.

153. For example, the helping mobile station receives an acknowledgment about the presence updating signal having been received in the Samsung Cloud servers (via a mobile telephone network), as indicated in the image below. As also indicated in the image below, the presence determination process (i.e., the scanning and filtering of advertisements related to UUID FD69 service identifier) is then reinitiated. If the mobile station remains in the special area in connection to a lost device it has already reported (i.e., the first and/or second radio communication defining devices), then it may send (after 20 minutes) a new updating signal related to the mobile station presence in the special area (in connection to that lost device): i.e., the presence updating signal is then related to the mobile station remaining in the special area.

> In both cases, the helper device receives a response indicating the success of the operation and the lost device location reporting process finished. The helper device returns to scanning but with a timeout (20 mins) for reporting any lost devices it has already reported.

Ex. 12, at 9, § 3.2.3 (the lost device as a mobile device).

154. For example, the helping mobile station stores in a local database the determination performed by the mobile station about its presence in the special area, in connection to the (each) found device private ID identifier (e.g., in connection to at least the first and/or second radio communication defining devices). After the storage, the helping mobile station sends a presence updating signal containing the (up to 5) recently found device(s) private ID(s) and the location to the Samsung Cloud servers). If it is the first (recent) reporting by the helping mobile station about the mobile station presence in the special area, the presence updating signal is then related to the mobile station entering into the special area.

> *4.5.2 Helper-Server Interaction.* A Helper Device stores found lost SmartTags in a local database together with other lost FMM/FME devices discovered by the Helper. The database can store a maximum of 1000 devices using the privacy ID of the device as the key. A tag is marked as expired if it has not appeared in the BLE scanning for 15 minutes and will be removed from the database.
>
> The helper device will report geolocations of lost SmartTags in the database based on estimated locations received from the WiFi or GPS service. Each request is similar to the one made by the Owner Device to create an OF device profile (see §4.3.6), except that the URL is `/geolocations`, as a Helper Device does not know the `deviceId` of the lost tag. Each location report task allows a maximum of 5 recently found devices ($time_{found} \geq time_{current} - 1$ (minute)) from the local database to be reported.

Ex. 12, at 17, § 4.5.2 (showing the lost device as a smart tag).

155. Defendants have and continue to indirectly infringe one or more claims of the '030 Patent by inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users

directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the '030 Patent. Defendants induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. *See, e.g.*, Exhibit 14, available at https://www.samsung.com/us/smartthings/#get-started (instructions to "Let's get started with SmartThings"); *see also, e.g.,* Exhibit 15, available at https://www.samsung.com/us/support/downloads/?model=N0002100 (providing the product manuals for mobile devices including phones, tablets, wearables, audio, virtual reality, and other mobile accessories).

156. Because of Defendants' inducement, Defendants' customers and end-users use the Accused Products in a way Defendants intend and they directly infringe the '030 Patent. Defendants perform these affirmative acts with knowledge of the '030 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '030 Patent.

157. Defendants have indirectly infringed and continues to indirectly infringe one or more claims of the '030 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Defendants' affirmative acts of selling and offering to sell the '030 Accused Products in this District and elsewhere in the United States and causing the '030 Accused Products to be manufactured, used, sold, and offered for sale contribute to others' use and manufacture of the Accused Products, such that the '030 Patent is directly infringed by others. The accused components within the Accused Products including, but not limited to, software manufactured by

Defendants, are material to the invention of the '030 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Defendants to be especially made or adapted for use in the infringement of the '030 Patent. Defendants perform these affirmative acts with knowledge of the '030 Patent and with intent, or willful blindness, that they cause the direct infringement of the '030 Patent.

158. Because of Defendants' direct and indirect infringement of the '030 Patent, ALT has suffered damages in an amount to be proved at trial.

COUNT VI
(Infringement of the '621 Patent)

159. Paragraphs 1 through 27 are incorporated by reference as if fully set forth herein.

160. ALT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the '621 Patent.

161. Defendants have and continue to directly infringe the claims of the '621 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, at least by performing each and every limitation of one or more method claims of the '621 Patent.

162. The Accused Products practice the method of at least claim 1 of the '621 Patent: A method associated with a provider of presence related services in connection with the use of a mobile station that is operable within a mobile telephone network, and at least a first radio communication defining device that transmits a first distinctive defining signal, the first distinctive defining signal at least partly defines a special area by its coverage, the provider of presence related services having one or more servers, the method comprising: electronically storing in the one or more servers of the provider of presence related services data capable of linking the mobile station to the special area, the data including a checking data of the first radio communication defining

device and an identifier related to the mobile station, the provider of presence related services being different than the mobile telephone network, receiving in the one or more servers of the provider of presence related services from the mobile station via the mobile telephone network an updating signal uncorrelated to any mobile station phone call establishment that identifies the mobile station's presence in the special area, the one or more servers of the provider of presence related services deriving from the updating signal by one or more processing devices having access to at least a portion of the data whether or not the mobile station is present in the special area; and enabling or disabling by use of the one or more processing devices a presence related service based upon the mobile station's presence or non-presence in the special area.

163. The Accused Products perform a method associated with a provider of presence related services in connection with the use of a mobile station that is operable within a mobile telephone network, and at least a first radio communication defining device that transmits a first distinctive defining signal, the first distinctive defining signal at least partly defines a special area by its coverage, the provider of presence related services having one or more servers. For example, Samsung SmartThings Find implement a method associated with the use of a helping mobile station and a missing Bluetooth device that is part of the Samsung Galaxy Find network for offline finding and that transmits a distinctive defining signal indicative that it is in an offline status (i.e., it is lost).

> *A device is "offline" when it is disconnected from a mobile network, or in the case of Galaxy wearables, disconnected from your Galaxy smartphone.*

Ex. 9, https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

164. For example, within Samsung Find a user may register his/her Galaxy devices such that he/she may keep them located when they are nearby, by using the SmartThings mobile app. As illustrated below, Samsung Find also provides an "offline finding" mode wherein user´s lost

Galaxy devices (smartphones, tablets, smartwatches, earbuds, smart tags) that are registered within the Galaxy Find network for offline finding can be found with the help of devices (e.g., smartphones).

165. For further example, the mobile station is a Samsung Galaxy smartphone registered within SmartThings Find "offline finding" and helping to find a missing Galaxy device that is offline and is part of the Galaxy Find network. The missing Galaxy device that is offline and is part of the Galaxy Find network for offline finding is a radio communication defining device.

> If you lost your Galaxy phone, tablet, watch, or earbuds, you don't need to worry. The SmartThings Find feature allows you to lock, locate, or completely wipe your data. Even your Samsung Wallet payment information can be locked or erased, and all of this can be done remotely. There are also similar services available for your watch and earbuds within the Galaxy Wearable app.

Ex. 10, available at https://www.samsung.com/us/support/answer/ANS00080182/ .

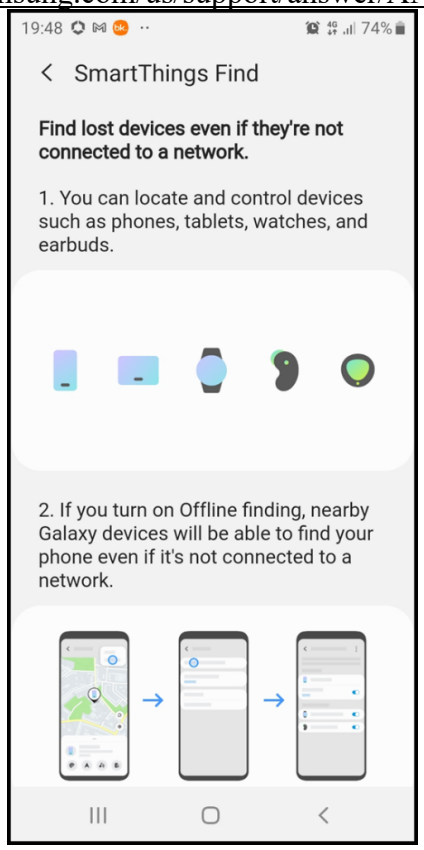


Figure 1: Smart Things mobile application, Tutorials

166. For example, if a Galaxy device that is part of the Galaxy Find network for offline finding (i.e., a radio communication defining device) has gone offline for 30 minutes, it starts

emitting a Bluetooth Low Energy signal (i.e., a distinctive defining signal) that can then be picked up by any "helping" Samsung Galaxy smartphone or tablet that is part of the Find network for offline finding.

Offline Doesn't Mean "Off-the-Grid"

With the SmartThings Find service, you can easily locate your missing device even if it's offline.[7] That's because SmartThings users can now opt in to securely use their Galaxy smartphone or tablet to help others locate their lost devices. Once a device has been offline for 30 minutes, it produces a BLE signal that can be received by other devices. If you report your device as lost via SmartThings Find, any nearby Galaxy smartphone or tablet that has opted into helping find misplaced devices can alert the Samsung server about its location, which will in turn notify you. All SmartThings Find user data is encrypted and securely protected, ensuring that the device's location is not revealed to anyone except its owner.

Ex. 9, https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

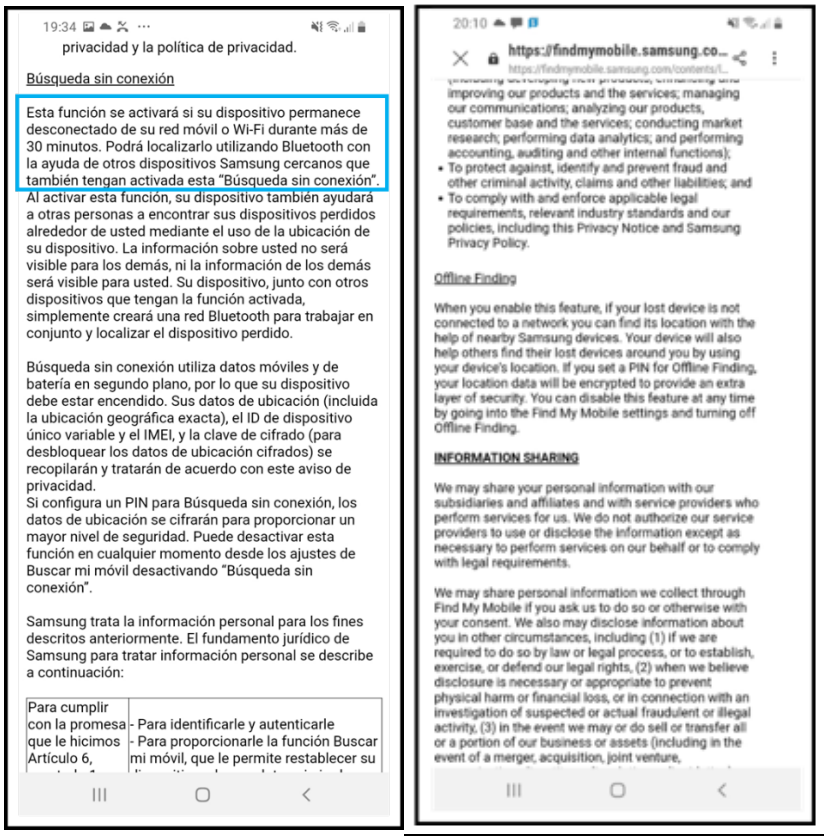


Figure 4: Offline Finding (translated as "The offline finding feature will activate if the device is disconnected from the mobile network or Wi-Fi for more than 30 minutes. It can be located using Bluetooth with the help of other nearby Samsung devices that also have "offline finding"

enabled.”).

167. For example, Samsung Galaxy offline finding service involves the use of a helping mobile station (a *finder* device) and a BLE radio communication defining device (a lost device) that transmits a BLE distinctive defining signal (a unique beacon).

> The OF protocol uses Bluetooth Low Energy (BLE) to broadcast a unique beacon for a lost device. This beacon is then picked up by nearby Samsung phones or tablets (the *finder* devices), which then forward the unique beacon, along with the location it was detected at, to a Samsung managed server. The owner of a lost device can then query the server to locate their device.

Ex. 12, at 1, Abstract.

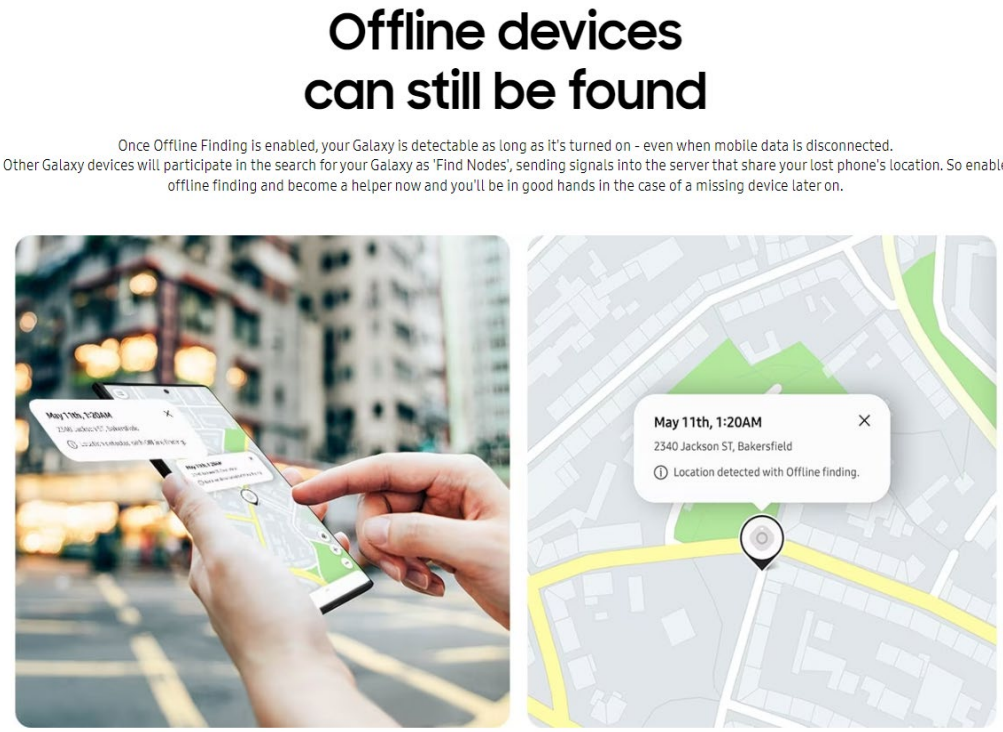
168. For further example, the Samsung Galaxy offline finding protocol has different modes of operation, depending on the type of device to be located (e.g., a lost mobile device or a lost smart tag in some examples below).

> The OF protocol has multiple modes of operations that depend on the functions supported by the devices involved as well as the type of device to be located.

Ex. 12, at 7, § 3.2

169. The Accused Products perform electronically storing in the one or more servers of the provider of presence related services data capable of linking the mobile station to the special area, the data including a checking data of the first radio communication defining device and an identifier related to the mobile station, the provider of presence related services being different than the mobile telephone network. For example, the helping mobile station observes a channel corresponding to the offline finding service BLE signals transmission and process any received signal to determine whether or not it is receiving an offline finding service defining signal that comprises an offline finding service identifier. *See, e.g.*, in the case of a lost mobile device, the service identifier is the one with UUID: FD69; *see also, e.g.*, in the case of a lost smart tag, the

service identifier is the one with UUID: FD5A. If the signal comprises an offline finding service identifier, at that point it is a defining signal for the helping mobile station. A processor within the helping mobile station processes any received defining signal and uses data previously stored in the mobile station (i.e., checking data), to determine whether or not the BLE defining signal received is a distinctive defining signal that at least partially defines the offline finding service special area. If the helping mobile station determines that it is receiving a distinctive defining signal it consequently identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it, as detailed below). Within SmartThings Find every Galaxy smartphone enabled for "offline finding" is converted into a receiver and locator, which effectively crowdsources the search of a missing device. Any device registered within SmartThings Find for "offline finding" becomes a Find Node of the Find network and may receive and process the offline finding BLE defining signals from lost Galaxy devices.



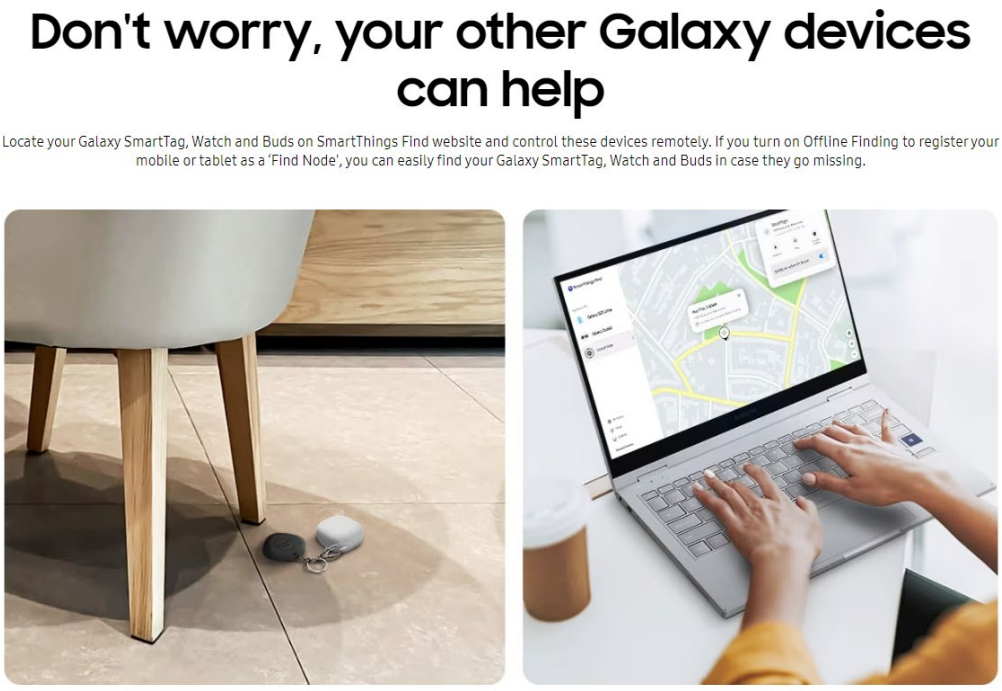


Exhibit 13, available at https://www.samsung.com/my/apps/smartthings-find/.

170. For example, the special area can be defined by the area covered by the Bluetooth distinctive defining signals of all the radio communication defining devices that are part of the Galaxy Find network for offline finding and are in an offline status at a given time. So, the special area is a dynamic-crowdsourced special area. The area covered by a given Bluetooth distinctive defining signal from a lost radio communication defining device that is in an offline status at least partly defines the special area. A user can make his/her Galaxy devices to join the Galaxy Find network by using the SmartThings mobile app. In the first image below the user registers within Find, in connection to the user´s account, a Samsung Galaxy J6 ("this device") and a Galaxy A30. The user subsequently registers both devices for offline finding, as illustrated in the second image below. The user can locate the devices by using the Find map (third image below).

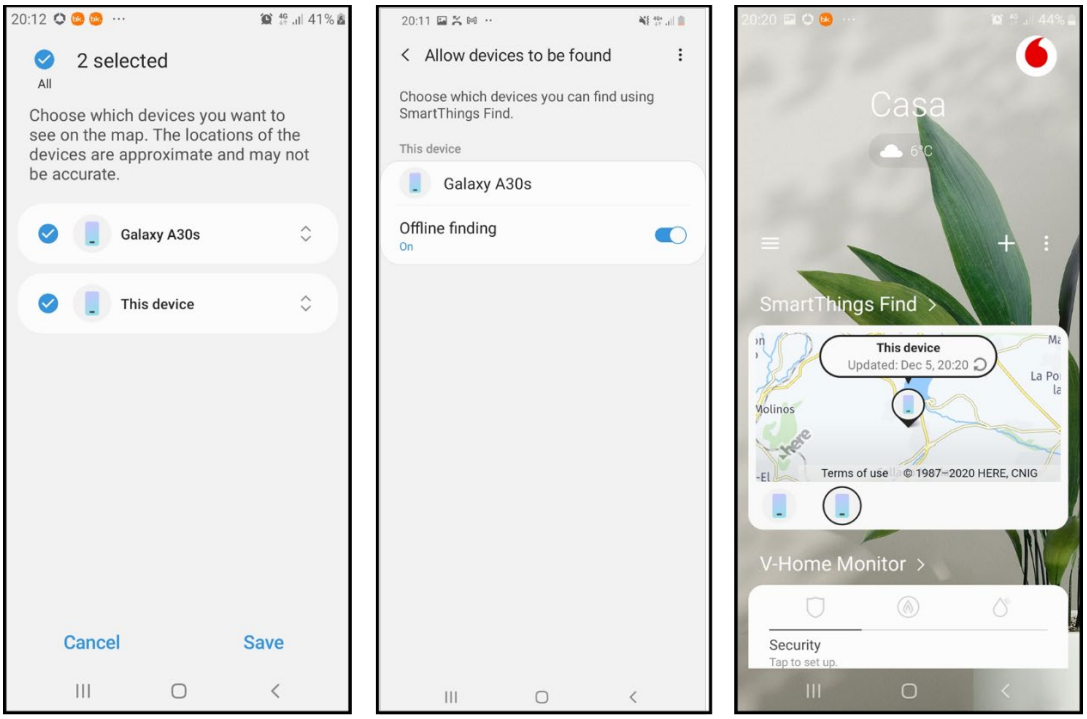


Figure 2: SmartThings mobile application, Register Device for Offline Finding

171. For example, a processor within a mobile device can help the mobile station in determining whether or not a received defining signal is a distinctive defining signal that at least party defines a special area and whether or not the mobile station is present in the offline finding service special area. When the lost device is a mobile device the result of the scan by the helping mobile station of advertisements with service identifier FD69 (*i.e.*, the service identifier of the offline finding service for lost Galaxy mobile devices) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (i.e., the privacy ID) by processing the distinctive defining signal.

> *3.2.3 Online (Helper) Device Operation.* When a device with OF enabled is online, it periodically scans over BLE. This scan is performed with a scan filter that makes sure only advertisements with the OF service's UUID (FD69) are returned from the scan. If there are any lost mode devices nearby, the helper device picks up their advertisements and parses through the data to extract the lost device's private ID.

Exhibit 8, at 9, § 3.2.3.

172. For example, the helping mobile station scans a BLE channel and is able to filter advertisements with service identifier FD69. To perform such filtering (*i.e.*, to determine that a defining signal with an offline finding service identifier is a distinctive defining signal with the FD69 service identifier) the mobile station must necessarily store data related to the FD69 service identifier (*i.e.*, store previous obtained checking data) and use the data to perform the filtering (*i.e.*, the determination). When the lost device is a smart tag the result of the scan by the helping mobile station of advertisements with service identifier FD5A (*i.e.*, the service identifier of the offline finding service for lost Galaxy smart tags) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (*i.e.*, the privacy ID) by processing the distinctive defining signal.

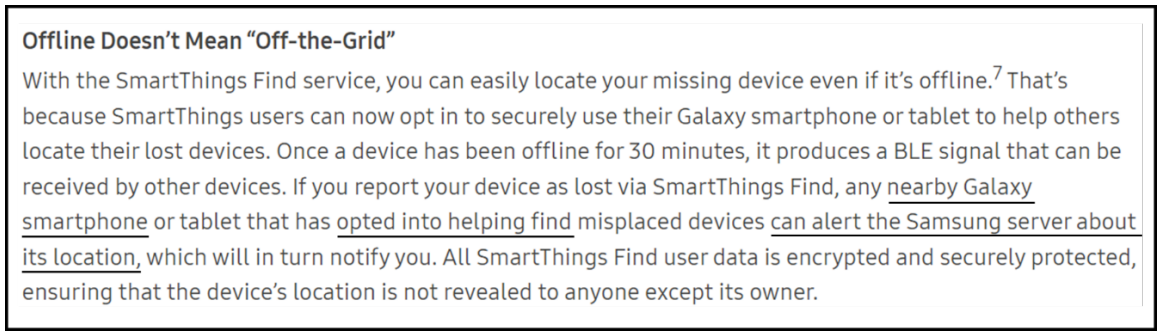
> *4.5.1 Helper-Tag Interaction.* A registered tag broadcasts OF advertisements on UUID FD5A continuously. Any active Galaxy device with "FindMyMobile" (FMM) enabled is a helper device that participates in Samsung's OF network. A helper device regularly scans for BLE advertisement data from nearby SmartTags. It filters BLE advertisements based on the advertising UUID for SmartTags (FD5A).

Exhibit 8, at 16, § 4.5.1.

> *4.5.2 Helper-Server Interaction.* A Helper Device stores found lost SmartTags in a local database together with other lost FMM/FME devices discovered by the Helper. The database can store a maximum of 1000 devices using the privacy ID of the device as the key.
>
> The helper device will report geolocations of lost SmartTags in the database based on estimated locations received from the WiFi or GPS service.

Exhibit 8, at 17, § 4.5.2.

173. For example, the helping mobile station scan a BLE channel and is able to filter advertisements with service identifier FD5A. To perform such filtering (*i.e.*, to determine that a defining signal with an offline finding service identifier is a distinctive defining signal with the FD5A service identifier) the mobile station must necessarily store data related to the FD5A service identifier (*i.e.*, store previous obtained checking data) and use the data to perform the filtering (*i.e.*, the determination). The helping mobile station sends to a mobile telephone network, and the mobile telephone network routes to the Samsung Cloud servers (Samsung is a provider of presence related services), a signal that identifies that the mobile station is nearby the missing device that is part of the Galaxy Find network (*i.e.*, it is present in the special area). Further, when nearby the lost radio communication defining device, the mobile station receives the distinctive defining signal. The helping mobile station is able to identify that the received defining signal is distinctive and to determine that it is present within the crowdsourced offline finding special area, as detailed above. The BLE distinctive signal must include a device identifier such that the Galaxy Find services related to the found device can be later provided in connection to that device, as elaborated below.



Offline Doesn't Mean "Off-the-Grid"

With the SmartThings Find service, you can easily locate your missing device even if it's offline.[7] That's because SmartThings users can now opt in to securely use their Galaxy smartphone or tablet to help others locate their lost devices. Once a device has been offline for 30 minutes, it produces a BLE signal that can be received by other devices. If you report your device as lost via SmartThings Find, any nearby Galaxy smartphone or tablet that has opted into helping find misplaced devices can alert the Samsung server about its location, which will in turn notify you. All SmartThings Find user data is encrypted and securely protected, ensuring that the device's location is not revealed to anyone except its owner.

Exhibit 9, available at https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices.

174. The Accused Products perform receiving in the one or more servers of the provider of presence related services from the mobile station via the mobile telephone network an updating signal uncorrelated to any mobile station phone call establishment that identifies the mobile station's presence in the special area, the one or more servers of the provider of presence related services deriving from the updating signal by one or more processing devices having access to at least a portion of the data whether or not the mobile station is present in the special area; and enabling or disabling by use of the one or more processing devices a presence related service based upon the mobile station's presence or non-presence in the special area. For example, the mobile station sends a signal about the mobile station´s presence in the special area via a mobile telephone network to the Samsung Cloud servers (Samsung is the provider of Galaxy Find "offline finding" presence related services), the signal including the mobile station's location. When sending the presence updating signal, the helping mobile station is not necessarily within Wi-Fi coverage. In that case, the mobile station must send its updating signal via a mobile telephone network. The presence signal must also include the device identifier of the first and/or second found device, because the Galaxy Find network needs this to subsequently provide related presence related services (e.g., the notification to the device owner about the found device location). The first image below (in Spanish) indicates that once a helping mobile station has identified that it is nearby a

lost device (i.e., the first and/or second radio communication defining device) that is in an offline status, the location and the IMEI of the helping mobile station and the corresponding device identifier of the lost device are collected and sent to the Galaxy Find service. (This information is sent to the Samsung Cloud servers within the updating signal; it is required to allow the device owner to locate the lost device).

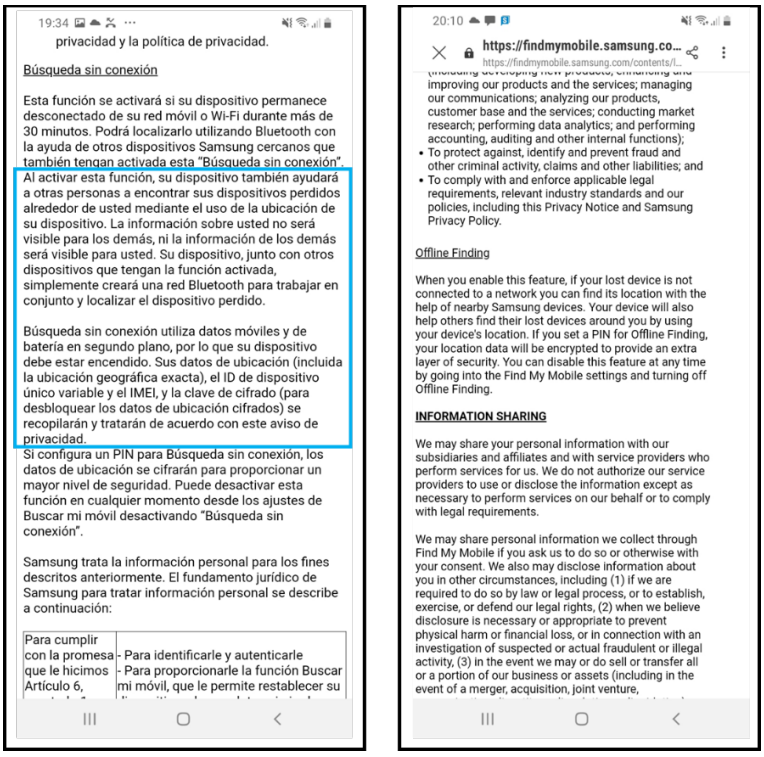


Figure 4 (translated as "… When activating this function (i.e., offline finding) your device will also help to other people to find their lost devices around you though the usage of your device location. The information about you will not be visible for the others, neither the information of the others will be visible for you. Your device together with other devices with offline finding activated, will simply create a Bluetooth network to work jointly and locate the missing device. Offline finding uses mobile and battery background data, so your device must be switched on. Your location data (including the exact geographical location), the unique variable device ID and the IMEI, and the ciphering key (to unblock the ciphered location data) will be collected and

managed according to this privacy advise…").

175. For example, the Samsung Cloud servers (Samsung is the provider of presence related services) receives the presence updating signal and uses it to provide presence related services (e.g., displaying to the first "found" device's owner, the device's location on a map, as illustrated below in connection to a found smart tag (and similarly for the second found device); or sending a notification to a device of the owner of the first or second lost device indicating that it has been found).

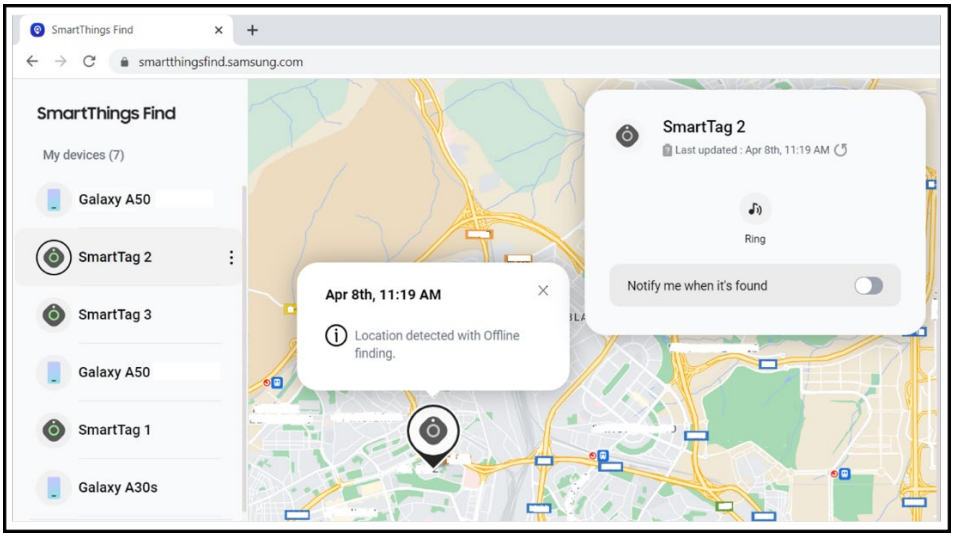


Figure 6: Galaxy SmartTag (available on https://smartthingsfind.samsung.com/ account)

176. For example, a helping mobile station (a *finder* device) identifies that it is present within the area of coverage of a device that is lost (e.g., the first and/or second radio communication defining device) and is part of the Samsung Galaxy offline finding network and sends to a vendor controller server (i.e., to the Samsung Cloud servers in the case of Galaxy devices and Samsung offline finding ecosystem) an updating signal indicating the presence status (the signal including unique beacon data received from the lost first/second device via BLE, together with the location of the device).

> In recent years, mobile device manufacturers such as Samsung and Apple have extended their lost-device tracking systems with an *offline finding* (OF) feature, which allows a lost mobile device to be found even when it does not have an internet connection. Both Apple and Samsung OF features share two key features: the use of Bluetooth Low Energy (BLE) for short range transmission of data between devices of a vendor, and crucially, an extensive network of (internet-connected) mobile devices (which we call *finder devices*) that relay location information to a vendor controlled server. We refer to the latter as the *OF network*. The basic idea is quite simple: when a (lost) device loses its internet connection, it starts broadcasting a unique beacon over BLE, which is then picked up by nearby finder devices participating in the OF network, who then forward the beacon and the location it is found to a vendor server.

Ex. 12 at 1, Introduction.

> An active finder device periodically scans for BLE advertisements from nearby FMM devices and reports the locations of those devices to a Samsung's server.

Ex. 12 at 2, Introduction.

> When a registered device goes offline, it starts advertising a unique payload that identifies itself. This payload is picked up by nearby online (registered) devices which parse the payload extracting the device's identifier. The online device then accesses available location services to find out its own location. It then sends the lost device's identifier and the location through to Samsung. The owner of the lost device can then access the FMM web service to find out its location.

Ex. 12 at 7, § 3.2.

177. The mobile station identifier of the helping mobile station is included within the updating signal sent to the Samsung Cloud.

> *Location report.* The received access token is present in each location report request to the server. Apart from information about the SmartTag and the access token, each location report contains an *id* field, generated as follows:
>
> $$id = androidId[0:4] \| SHA256(androidId \| \text{“}findMyMobile\text{”})$$
>
> where *androidId* denotes the Android Device ID of the helper device.[10]

Ex. 12 at 10, § 4.2.3

178. For example, the sending of the updating signal is uncorrelated to any mobile station phone call establishment. The updating signal is sent when the helping mobile station enters into the offline finding special area and starts receiving the first and/or second distinctive defining signals from the first/second lost radio communication defining device. Also, if the mobile station remains nearby the first and/or second lost device (i.e., remains in the special area) it periodically sends a presence updating signal via mobile telephone network to the Samsung Cloud servers, as further elaborated below. The helping mobile station stores in a local database the determination performed by the mobile station about its presence in the special area, in relation to each found device private ID identifier (i.e., in connection to at least the first and/or second radio communication defining devices). After storage, the helping mobile station sends a presence updating signal containing the (each) lost device private ID and the location to the Samsung Cloud servers. If it is the first (recent) reporting by the helping mobile station about its presence in the special area, the presence updating signal is then related to the mobile station entering into the special area.

3.2.3 Online (Helper) Device Operation. When a device with OF enabled is online, it periodically scans over BLE. This scan is performed with a scan filter that makes sure only advertisements with the OF service's UUID (FD69) are returned from the scan. If there are any lost mode devices nearby, the helper device picks up their advertisements and parses through the data to extract the lost device's private ID. To facilitate multiple lost devices nearby, each helper device maintains a local SQL database in which it adds any lost devices to.

The helper device then stops scanning and starts the location reporting process. Firstly, it accesses the SQL database to get the list of lost devices to report. Then the helper uses any available location services (GPS, Wi-Fi etc.) to pinpoint its own location and record it. The next process differs depending on whether the user has chosen to encrypt their location or not.

- Unencrypted: The helper device creates a HTTPS request containing the lost device's private ID and its unencrypted latitude/longitude. The request is then sent to Samsung's location reporting server.
- Encrypted: The helper device first contacts Samsung (over HTTPS) to receive a public key. Then it creates another HTTPS request containing the lost device's private ID and its latitude/longitude. The latitude/longitude are encrypted using an Elliptic Curve Integrated Encryption Scheme (ECIES) with the public key that was received from Samsung. The request is then sent to Samsung's location reporting server.

Ex. 12 at 9, § 3.2.3.

179. For example, the helping mobile station receives an acknowledgment about the presence updating signal having been received in the Samsung Cloud servers (via a mobile telephone network), as indicated in the image below. As also indicated in the image below, the presence determination process (i.e., the scanning and filtering of advertisements related to UUID FD69 service identifier) is then reinitiated. If the mobile station remains in the special area in connection to a lost device it has already reported (i.e., the first and/or second radio communication defining devices), then it may send (after 20 minutes) a new updating signal related to the mobile station presence in the special area (in connection to that lost device): i.e., the presence updating signal is then related to the mobile station remaining in the special area.

> In both cases, the helper device receives a response indicating the success of the operation and the lost device location reporting process finished. The helper device returns to scanning but with a timeout (20 mins) for reporting any lost devices it has already reported.

Ex. 12, at 9, § 3.2.3 (the lost device as a mobile device).

180. For example, the helping mobile station stores in a local database the determination performed by the mobile station about its presence in the special area, in connection to the (each) found device private ID identifier (e.g., in connection to at least the first and/or second radio communication defining devices). After the storage, the helping mobile station sends a presence updating signal containing the (up to 5) recently found device(s) private ID(s) and the location to the Samsung Cloud servers). If it is the first (recent) reporting by the helping mobile station about the mobile station presence in the special area, the presence updating signal is then related to the mobile station entering into the special area.

> *4.5.2 Helper-Server Interaction.* A Helper Device stores found lost SmartTags in a local database together with other lost FMM/FME devices discovered by the Helper. The database can store a maximum of 1000 devices using the privacy ID of the device as the key. A tag is marked as expired if it has not appeared in the BLE scanning for 15 minutes and will be removed from the database.
>
> The helper device will report geolocations of lost SmartTags in the database based on estimated locations received from the WiFi or GPS service. Each request is similar to the one made by the Owner Device to create an OF device profile (see §4.3.6), except that the URL is `/geolocations`, as a Helper Device does not know the `deviceId` of the lost tag. Each location report task allows a maximum of 5 recently found devices ($time_{found} \geq time_{current} - 1$ (minute)) from the local database to be reported.

Ex. 12, at 17, § 4.5.2 (showing the lost device as a smart tag).

181. Defendants have and continue to indirectly infringe one or more claims of the '621 Patent by inducing infringement by others, such as Defendants' customers and end-users, in this District and elsewhere in the United States. For example, Defendants' customers and end-users

directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the '621 Patent. Defendants induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. *See, e.g.*, Exhibit 14, available at https://www.samsung.com/us/smartthings/#get-started (instructions to "Let's get started with SmartThings"); *see also, e.g.,* Exhibit 15, available at https://www.samsung.com/us/support/downloads/?model=N0002100 (providing the product manuals for mobile devices including phones, tablets, wearables, audio, virtual reality, and other mobile accessories).

182. Because of Defendants' inducement, Defendants' customers and end-users use the Accused Products in a way Defendants intend and they directly infringe the '621 Patent. Defendants perform these affirmative acts with knowledge of the '621 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '621 Patent.

183. Defendants have indirectly infringed and continues to indirectly infringe one or more claims of the '621 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Defendants' affirmative acts of selling and offering to sell the '621 Accused Products in this District and elsewhere in the United States and causing the '621 Accused Products to be manufactured, used, sold, and offered for sale contribute to others' use and manufacture of the Accused Products, such that the '621 Patent is directly infringed by others. The accused components within the Accused Products including, but not limited to, software manufactured by

Defendants, are material to the invention of the '621 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Defendants to be especially made or adapted for use in the infringement of the '621 Patent. Defendants perform these affirmative acts with knowledge of the '621 Patent and with intent, or willful blindness, that they cause the direct infringement of the '621 Patent.

184. Because of Defendants' direct and indirect infringement of the '621 Patent, ALT has suffered damages in an amount to be proved at trial.

COUNT VII
(Infringement of the '032 Patent)

185. Paragraphs 1 through 27 are incorporated by reference as if fully set forth herein.

186. ALT has not licensed or otherwise authorized Defendants to make, use, offer for sale, sell, or import any products that embody the inventions of the '032 Patent.

187. Defendants have and continue to directly infringe the claims of the '032 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, at least by performing each and every limitation of one or more method claims of the '032 Patent.

188. The Accused Products practice the method of at least claim 1 of the '032 Patent: A method associated with a provider of presence related services and a mobile station that stores in a memory first checking data and uses the first checking data to determine whether or not a defining signal received from a radio communication defining device is a distinctive defining signal, the distinctive defining signal at least partly defines a special area by its coverage, the method comprising: one or more servers of a provider of presence related services receiving from the mobile station via a mobile telephone network an updating signal that identifies the mobile station's presence in the special area, the provider of presence related services being different than

the mobile telephone network; and storing in the one or more servers a parameters database having an operating parameter whose value is determined at least in part by the updating signal received from the mobile station; and sending from the one or more servers to the mobile station second checking data different from the first checking data to modify the special area.

189. The Accused Products perform a method associated with a provider of presence related services. For example, Samsung SmartThings Find implement a method associated with the use of a helping mobile station and a missing Bluetooth device that is part of the Samsung Galaxy Find network for offline finding and that transmits a distinctive defining signal indicative that it is in an offline status (i.e., it is lost).

> *A device is "offline" when it is disconnected from a mobile network, or in the case of Galaxy wearables, disconnected from your Galaxy smartphone.*

Ex. 9, https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

190. For example, within Samsung Find a user may register his/her Galaxy devices such that he/she may keep them located when they are nearby, by using the SmartThings mobile app. As illustrated below, Samsung Find also provides an "offline finding" mode wherein user´s lost Galaxy devices (smartphones, tablets, smartwatches, earbuds, smart tags) that are registered within the Galaxy Find network for offline finding can be found with the help of devices (e.g., smartphones).

191. For further example, the mobile station is a Samsung Galaxy smartphone registered within SmartThings Find "offline finding" and helping to find a missing Galaxy device that is offline and is part of the Galaxy Find network. The missing Galaxy device that is offline and is part of the Galaxy Find network for offline finding is a radio communication defining device.

If you lost your Galaxy phone, tablet, watch, or earbuds, you don't need to worry. The SmartThings Find feature allows you to lock, locate, or completely wipe your data. Even your Samsung Wallet payment information can be locked or erased, and all of this can be done remotely. There are also similar services available for your watch and earbuds within the Galaxy Wearable app.

Ex. 10, available at https://www.samsung.com/us/support/answer/ANS00080182/ .

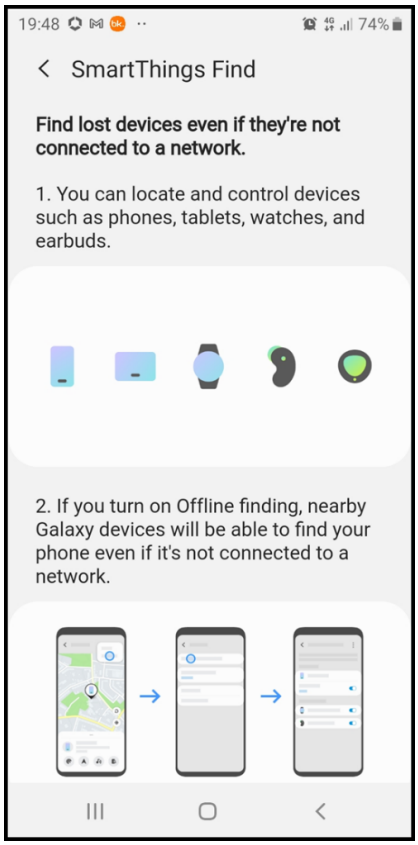


Figure 1: Smart Things mobile application, Tutorials

192. For example, if a Galaxy device that is part of the Galaxy Find network for offline finding (i.e., a radio communication defining device) has gone offline for 30 minutes, it starts emitting a Bluetooth Low Energy signal (i.e., a distinctive defining signal) that can then be picked up by any "helping" Samsung Galaxy smartphone or tablet that is part of the Find network for offline finding.

Offline Doesn't Mean "Off-the-Grid"

With the SmartThings Find service, you can easily locate your missing device even if it's offline.[7] That's because SmartThings users can now opt in to securely use their Galaxy smartphone or tablet to help others locate their lost devices. Once a device has been offline for 30 minutes, it produces a BLE signal that can be received by other devices. If you report your device as lost via SmartThings Find, any nearby Galaxy smartphone or tablet that has opted into helping find misplaced devices can alert the Samsung server about its location, which will in turn notify you. All SmartThings Find user data is encrypted and securely protected, ensuring that the device's location is not revealed to anyone except its owner.

Ex. 9, https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

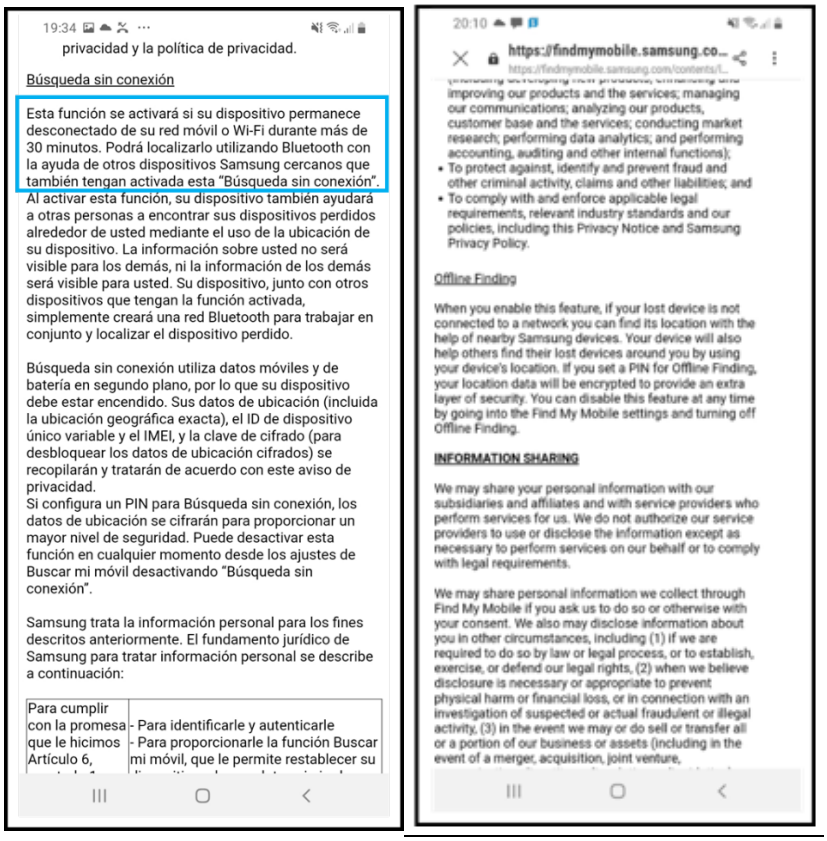


Figure 4: Offline Finding (translated as "The offline finding feature will activate if the device is disconnected from the mobile network or Wi-Fi for more than 30 minutes. It can be located using Bluetooth with the help of other nearby Samsung devices that also have "offline finding" enabled.").

193. For example, Samsung Galaxy offline finding service involves the use of a helping mobile station (a *finder* device) and a BLE radio communication defining device (a lost device) that transmits a BLE distinctive defining signal (a unique beacon).

> The OF protocol uses Bluetooth Low Energy (BLE) to broadcast a unique beacon for a lost device. This beacon is then picked up by nearby Samsung phones or tablets (the *finder* devices), which then forward the unique beacon, along with the location it was detected at, to a Samsung managed server. The owner of a lost device can then query the server to locate their device.

Ex. 12, at 1, Abstract.

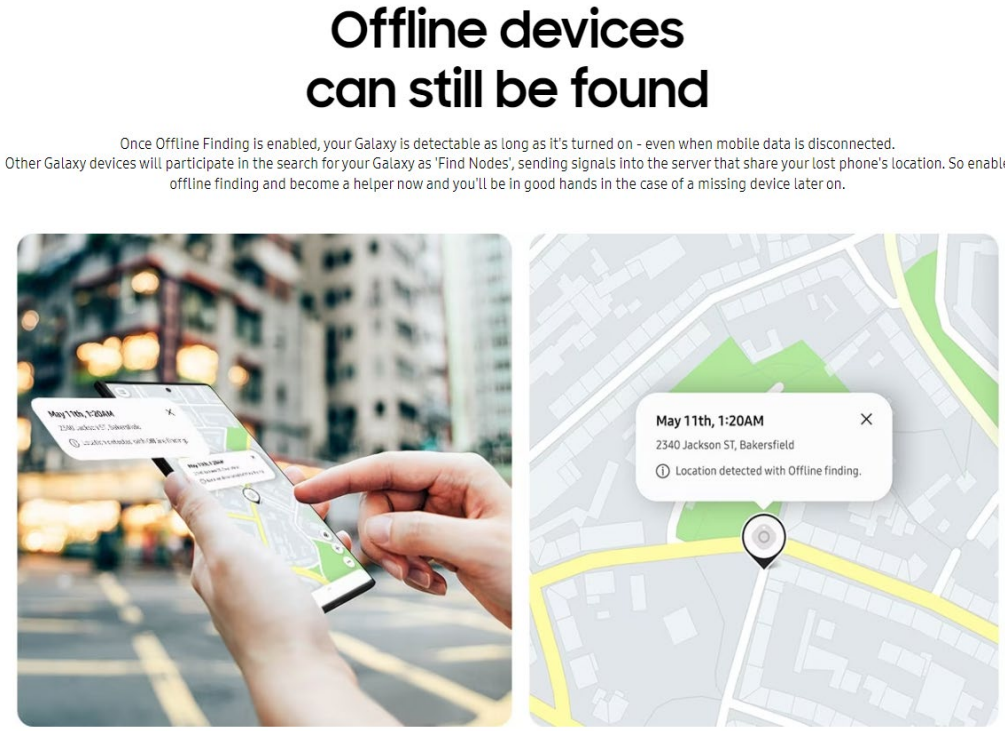
194. For further example, the Samsung Galaxy offline finding protocol has different modes of operation, depending on the type of device to be located (e.g., a lost mobile device or a lost smart tag in some examples below).

> The OF protocol has multiple modes of operations that depend on the functions supported by the devices involved as well as the type of device to be located.

Ex. 12, at 7, § 3.2

195. The Accused Products perform a method where a mobile station that stores in a memory first checking data and uses the first checking data to determine whether or not a defining signal received from a radio communication defining device is a distinctive defining signal, the distinctive defining signal at least partly defines a special area by its coverage. For example, the helping mobile station observes a channel corresponding to the offline finding service BLE signals transmission and process any received signal to determine whether or not it is receiving an offline finding service defining signal that comprises an offline finding service identifier. *See, e.g.*, in the case of a lost mobile device, the service identifier is the one with UUID: FD69; *see also, e.g.*, in the case of a lost smart tag, the service identifier is the one with UUID: FD5A. If the signal comprises an offline finding service identifier, at that point it is a defining signal for the helping mobile station. A processor within the helping mobile station processes any received defining signal and uses data previously stored in the mobile station (i.e., checking data), to determine whether or not the BLE defining signal received is a distinctive defining signal that at least partially defines the offline finding service special area. If the helping mobile station determines that it is receiving a distinctive defining signal it consequently identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it, as detailed below). Within SmartThings Find every Galaxy smartphone enabled for "offline finding" is converted into a

receiver and locator, which effectively crowdsources the search of a missing device. Any device registered within SmartThings Find for "offline finding" becomes a Find Node of the Find network and may receive and process the offline finding BLE defining signals from lost Galaxy devices.



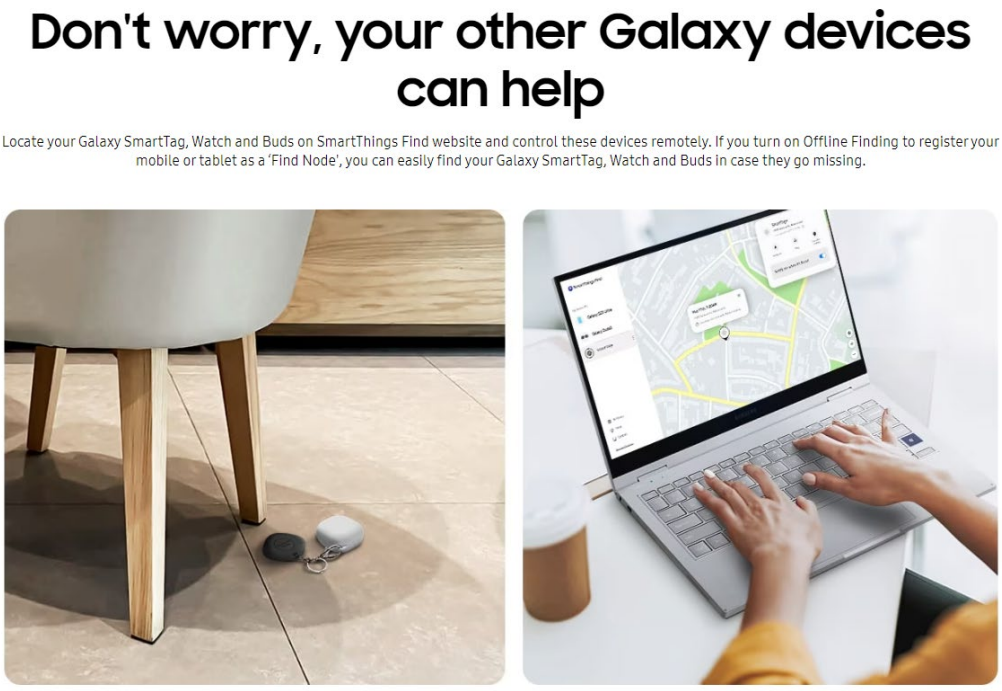


Exhibit 13, available at https://www.samsung.com/my/apps/smartthings-find/.

196. For example, the special area can be defined by the area covered by the Bluetooth distinctive defining signals of all the radio communication defining devices that are part of the Galaxy Find network for offline finding and are in an offline status at a given time. So, the special area is a dynamic-crowdsourced special area. The area covered by a given Bluetooth distinctive defining signal from a lost radio communication defining device that is in an offline status at least partly defines the special area. A user can make his/her Galaxy devices to join the Galaxy Find network by using the SmartThings mobile app. In the first image below the user registers within Find, in connection to the user´s account, a Samsung Galaxy J6 (“this device”) and a Galaxy A30. The user subsequently registers both devices for offline finding, as illustrated in the second image below. The user can locate the devices by using the Find map (third image below).

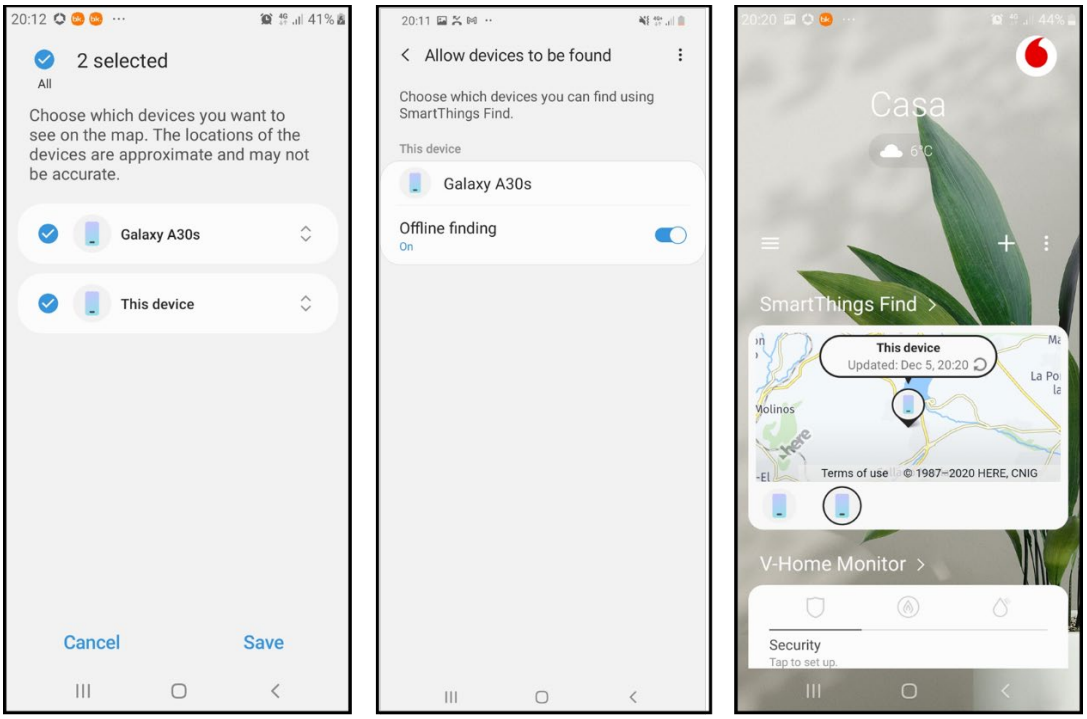


Figure 2: SmartThings mobile application, Register Device for Offline Finding

197. For example, a processor within a mobile device can help the mobile station in determining whether or not a received defining signal is a distinctive defining signal that at least party defines a special area and whether or not the mobile station is present in the offline finding service special area. When the lost device is a mobile device the result of the scan by the helping mobile station of advertisements with service identifier FD69 (*i.e.*, the service identifier of the offline finding service for lost Galaxy mobile devices) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (i.e., the privacy ID) by processing the distinctive defining signal.

> *3.2.3 Online (Helper) Device Operation.* When a device with OF enabled is online, it periodically scans over BLE. This scan is performed with a scan filter that makes sure only advertisements with the OF service's UUID (FD69) are returned from the scan. If there are any lost mode devices nearby, the helper device picks up their advertisements and parses through the data to extract the lost device's private ID.

Exhibit 8, at 9, § 3.2.3.

198. For example, the helping mobile station scans a BLE channel and is able to filter advertisements with service identifier FD69. To perform such filtering (*i.e.*, to determine that a defining signal with an offline finding service identifier is a distinctive defining signal with the FD69 service identifier) the mobile station must necessarily store data related to the FD69 service identifier (*i.e.*, store previous obtained checking data) and use the data to perform the filtering (*i.e.*, the determination). When the lost device is a smart tag the result of the scan by the helping mobile station of advertisements with service identifier FD5A (*i.e.*, the service identifier of the offline finding service for lost Galaxy smart tags) serves to the helping mobile station to determine that a received advertisement signal is distinctive. The helping mobile station further identifies that it is present within the special area (as the coverage of the distinctive defining signal party defines it). The helping mobile station obtains the lost device ID (*i.e.*, the privacy ID) by processing the distinctive defining signal.

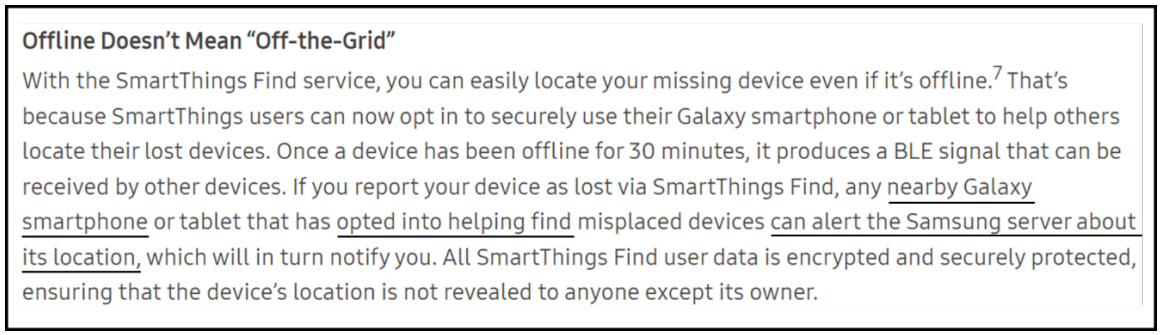
> *4.5.1 Helper-Tag Interaction.* A registered tag broadcasts OF advertisements on UUID FD5A continuously. Any active Galaxy device with "FindMyMobile" (FMM) enabled is a helper device that participates in Samsung's OF network. A helper device regularly scans for BLE advertisement data from nearby SmartTags. It filters BLE advertisements based on the advertising UUID for SmartTags (FD5A).

Exhibit 8, at 16, § 4.5.1.

> *4.5.2 Helper-Server Interaction.* A Helper Device stores found lost SmartTags in a local database together with other lost FMM/FME devices discovered by the Helper. The database can store a maximum of 1000 devices using the privacy ID of the device as the key.
>
> The helper device will report geolocations of lost SmartTags in the database based on estimated locations received from the WiFi or GPS service.

Exhibit 8, at 17, § 4.5.2.

199. For example, the helping mobile station scan a BLE channel and is able to filter advertisements with service identifier FD5A. To perform such filtering (*i.e.*, to determine that a defining signal with an offline finding service identifier is a distinctive defining signal with the FD5A service identifier) the mobile station must necessarily store data related to the FD5A service identifier (*i.e.*, store previous obtained checking data) and use the data to perform the filtering (*i.e.*, the determination). The helping mobile station sends to a mobile telephone network, and the mobile telephone network routes to the Samsung Cloud servers (Samsung is a provider of presence related services), a signal that identifies that the mobile station is nearby the missing device that is part of the Galaxy Find network (*i.e.*, it is present in the special area). Further, when nearby the lost radio communication defining device, the mobile station receives the distinctive defining signal. The helping mobile station is able to identify that the received defining signal is distinctive and to determine that it is present within the crowdsourced offline finding special area, as detailed above. The BLE distinctive signal must include a device identifier such that the Galaxy Find services related to the found device can be later provided in connection to that device, as elaborated below.



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With the SmartThings Find service, you can easily locate your missing device even if it's offline.[7] That's because SmartThings users can now opt in to securely use their Galaxy smartphone or tablet to help others locate their lost devices. Once a device has been offline for 30 minutes, it produces a BLE signal that can be received by other devices. If you report your device as lost via SmartThings Find, any nearby Galaxy smartphone or tablet that has opted into helping find misplaced devices can alert the Samsung server about its location, which will in turn notify you. All SmartThings Find user data is encrypted and securely protected, ensuring that the device's location is not revealed to anyone except its owner.

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200. The Accused Products perform a method where one or more servers of a provider of presence related services receiving from the mobile station via a mobile telephone network an updating signal that identifies the mobile station's presence in the special area, the provider of presence related services being different than the mobile telephone network and perform storing in the one or more servers a parameters database having an operating parameter whose value is determined at least in part by the updating signal received from the mobile station. For example, as the Bluetooth Low Energy distinctive defining signal is transmitted by the radio communication defining device when it has gone offline for more than 30 minutes, the signal serves to identify (e.g., using a "offline finding service identifier") that the device is in an offline status for offline finding. The offline status of the radio communication defining device (e.g., a Galaxy SmartTag registered within Galaxy Find) implies that it is not located nearby any other Galaxy device of the device owner with capacity to update the location of the missing device and associated to the same Samsung Account (e.g., a Galaxy S23 registered within Find in connection to the same account). If the radio communication defining device is not located nearby those other Galaxy devices it means that it is located in an environment that is outside the environment defined as the sum of the volumetric spaces wherein the BLE signal from the missing user´s device can be received in each of the other user´s Galaxy devices (associated to the same user´s account). Said outside

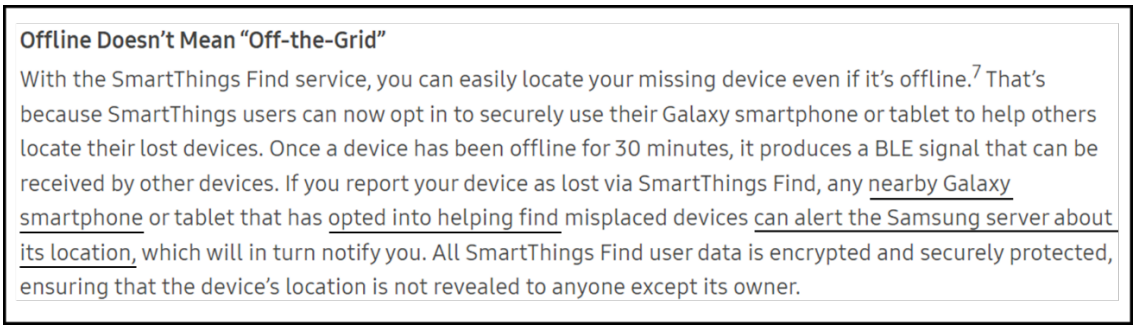
environment is the predetermined environment, and the fact that the distinctive defining signal identifies that the device is offline for offline finding serves to indicate to the mobile station that the device is in the referred predetermined environment. As the predetermined environment depends on the location of the other user´s Galaxy devices, the predetermined environment changes when the location of the other Galaxy devices changes. As an example: a user has registered within Galaxy Find a Samsung Galaxy S23, a Galaxy Buds and a Galaxy Smart Tag, and he has lost the Galaxy Smart Tag. On the basis of the Samsung Galaxy S3 being switched on and with the Bluetooth enabled, the Galaxy SmartTag being offline implies that the SmartTag is located within an environment that is outside the volumetric space wherein the BLE signal from the lost SmartTag can be received in the Samsung Galaxy S23 smartphone. Said outside environment is the predetermined environment The following table summarizes the key features of BLE signals. The referred other user´s Galaxy devices can receive a BLE signal from the Galaxy device when being in range. Otherwise, the Galaxy device is lost and it is in the predetermined environment.

Feature	BLE
Location Accuracy	< 5 m
Range	Up to 100 m
Frequencies	2.4 GHz

Exhibit 11, available at https://www.inpixon.com/blog/chirp-uwb-ble-location-tracking-techniques.

201. For example, the helping mobile station sends via a mobile telephone network to the

Samsung Cloud servers (Samsung is a provider of presence related services) a signal that identifies that the mobile station is nearby the missing device that is part of the Galaxy Find network (i.e., it is present in the special area). Further, when nearby the lost radio communication defining device, the mobile station receives the distinctive defining signal. The helping mobile station is able to identify that the received signal is distinctive in that it relates to the offline finding service (e.g., may comprise an "offline finding service identifier") which means that it is transmitted by a BLE Galaxy device that is enabled for offline finding and is in an offline status. By determining that it is receiving the BLE offline finding signal the helping mobile station also identifies that it is present within the crowdsourced offline finding special area (as the device is part of the Find network for offline finding and its BLE offline finding signal partly defines the special area). The BLE distinctive signal must include a device identifier such that the Galaxy Find services related to the found device can be later provided in connection to that device, as elaborated below.



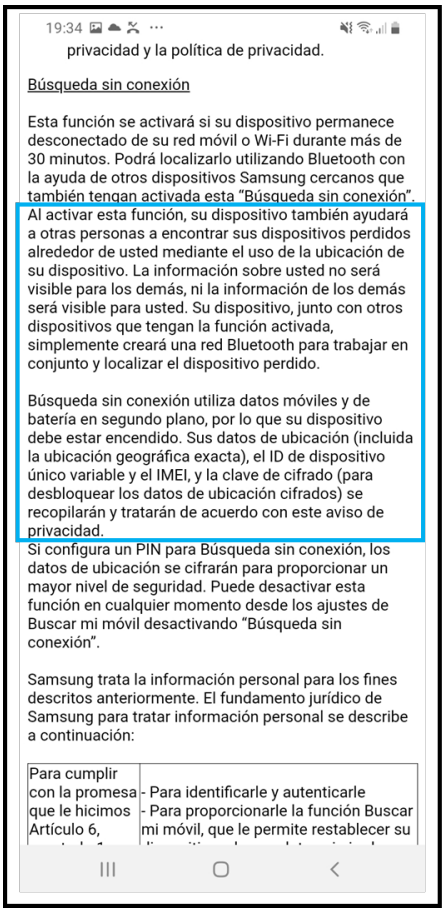
Offline Doesn't Mean "Off-the-Grid"

With the SmartThings Find service, you can easily locate your missing device even if it's offline.[7] That's because SmartThings users can now opt in to securely use their Galaxy smartphone or tablet to help others locate their lost devices. Once a device has been offline for 30 minutes, it produces a BLE signal that can be received by other devices. If you report your device as lost via SmartThings Find, any nearby Galaxy smartphone or tablet that has opted into helping find misplaced devices can alert the Samsung server about its location, which will in turn notify you. All SmartThings Find user data is encrypted and securely protected, ensuring that the device's location is not revealed to anyone except its owner.

Ex. 9, available at https://www.samsungmobilepress.com/pressreleases/samsung-launches-smartthings-find-a-new-way-to-quickly-and-easily-locate-your-galaxy-devices

202. For example, as a result of the helping mobile station identifying that it is present in the crowdsourced special area the mobile station sends (encrypted and securely protected) a signal about the mobile station´s presence in the special area to the Samsung Cloud servers (Samsung is the provider of Galaxy Find "offline finding" presence related services), the signal including the mobile station location as detailed in the image above. A helping mobile station is not typically

placed at the user´s home when receiving the distinctive defining signal from a lost device, but in a public environment. So, in those scenarios the mobile station is not connected to the network via Wi-Fi but thought mobile telephony communications, i.e., via a mobile telephone network. The presence signal must also include the device identifier, as it is required by the Samsung Cloud to subsequently provide related presence related services (e.g., the above referred notification about the device location). The first image below (in Spanish) indicates(*) that once a helping mobile station has identified that it is nearby a lost device that is in an offline status, the location and the IMEI of the helping mobile station and the device identifier of the lost device are collected to provide the Find service (this information is sent to the Samsung Cloud servers within the updating signal, as it is required to allow the device owner to locate the device, once found by the helping mobile station).



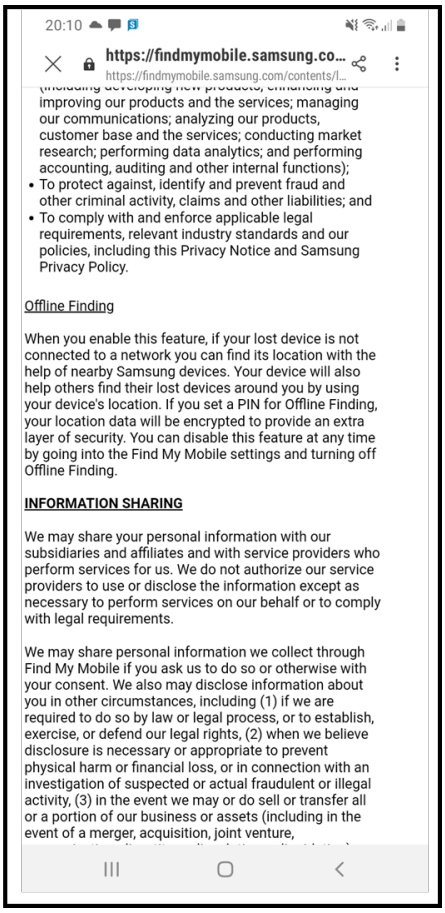


Figure 4: Offline Finding (*translated as "… When activating this function (i.e., offline finding) your device will also help to other people to find their lost devices around you though the usage of your device location. The information about you will not be visible for the others, neither the information of the others will be visible for you. Your device together with other devices with offline finding activated, will simply create a Bluetooth network to work jointly and locate the missing device. Offline finding uses mobile and battery background data, so your device must be switched on. Your location data (including the exact geographical location), the unique variable device ID and the IMEI, and the ciphering key (to unblock the ciphered location data) will be collected and managed according to this privacy advise…"*).

203. For example, a helping mobile station (a *finder* device) identifies that it is present within the area of coverage of a device that is lost and is part of the Samsung Galaxy offline finding network and sends to a vendor controller server (i.e., to the Samsung Cloud servers in the case of Galaxy devices and Samsung offline finding ecosystem) an updating signal indicative of the presence status (the signal including the unique beacon data received from the lost device via BLE, together with the location of the device).

> In recent years, mobile device manufacturers such as Samsung and Apple have extended their lost-device tracking systems with an *offline finding* (OF) feature, which allows a lost mobile device to be found even when it does not have an internet connection. Both Apple and Samsung OF features share two key features: the use of Bluetooth Low Energy (BLE) for short range transmission of data between devices of a vendor, and crucially, an extensive network of (internet-connected) mobile devices (which we call *finder devices*) that relay location information to a vendor controlled server. We refer to the latter as the *OF network*. The basic idea is quite simple: when a (lost) device loses its internet connection, it starts broadcasting a unique beacon over BLE, which is then picked up by nearby finder devices participating in the OF network, who then forward the beacon and the location it is found to a vendor server.

Ex. 12, at 1-2, Introduction.

> When a registered device goes offline, it starts advertising a unique payload that identifies itself. This payload is picked up by nearby online (registered) devices which parse the payload extracting the device's identifier. The online device then accesses available location services to find out its own location. It then sends the lost device's identifier and the location through to Samsung. The owner of the lost device can then access the FMM web service to find out its location.

Ex. 12, at 7, § 3.2.

> The helper device then stops scanning and starts the location reporting process. Firstly, it accesses the SQL database to get the list of lost devices to report. Then the helper uses any available location services (GPS, Wi-Fi etc.) to pinpoint its own location and record it. The next process differs depending on whether the user has chosen to encrypt their location or not.
>
> - Unencrypted: The helper device creates a HTTPS request containing the lost device's private ID and its unencrypted latitude/longitude. The request is then sent to Samsung's location reporting server.
> - Encrypted: The helper device first contacts Samsung (over HTTPS) to receive a public key. Then it creates another HTTPS request containing the lost device's private ID and its latitude/longitude. The latitude/longitude are encrypted using an Elliptic Curve Integrated Encryption Scheme (ECIES) with the public key that was received from Samsung. The request is then sent to Samsung's location reporting server.

Ex. 12, at 9, § 3.2.3.

204. For example, the mobile station identifier of the helping mobile station is included within the updating signal sent to the Samsung Cloud.

> *Location report.* The received access token is present in each location report request to the server. Apart from information about the SmartTag and the access token, each location report contains an *id* field, generated as follows:
>
> $$id = androidId[0:4] \| SHA256(androidId \| \text{“}findMyMobile\text{”})$$
>
> where *androidId* denotes the Android Device ID of the helper device.[10]

Ex. 12, at 10, § 4.2.3.

205. For example, the updating signal is useable by the Samsung Cloud servers to adjust

a [lost/found] service flag operational parameter to “found” and to adjust/activate the presence related services provided to the helping mobile station, as services requestor (as elaborated herein below). The Samsung Cloud servers (Samsung is the provider of presence related services) receives the presence updating signal and uses it to provide presence related services. When a Find “offline finding” registered device related to a given SmartThings user´s account is missing a service flag operational parameter is set to “missing” in the Samsung Cloud such that the device is displayed as “disabled” within the SmartThings Find map, as illustrated in the image below in connection to a lost Galaxy A30 device. In that situation the user can wait for a mobile station that is part of the Galaxy Find network for offline finding to help in finding it. When the updating signal from the helping mobile station (comprising the location and the IMEI of the helping mobile station and the device identifier of the found device) is received in the Samsung Cloud it must adjust the referred service flag operational parameter to “found” (in connection to the mobile station finding it, and also in relation to the found device owner). The image below illustrates how the found device owner benefits from the visualization of an updated location within a SmartThings Find map, in connection to the device found by the helping mobile station (as a result of the activation (2) referred to above). If the device owner selected the “Notify me when it´s found” feature (see the first image below) then he/she will be notified when the missing device is found (as a result of the activation (3) referred to above).

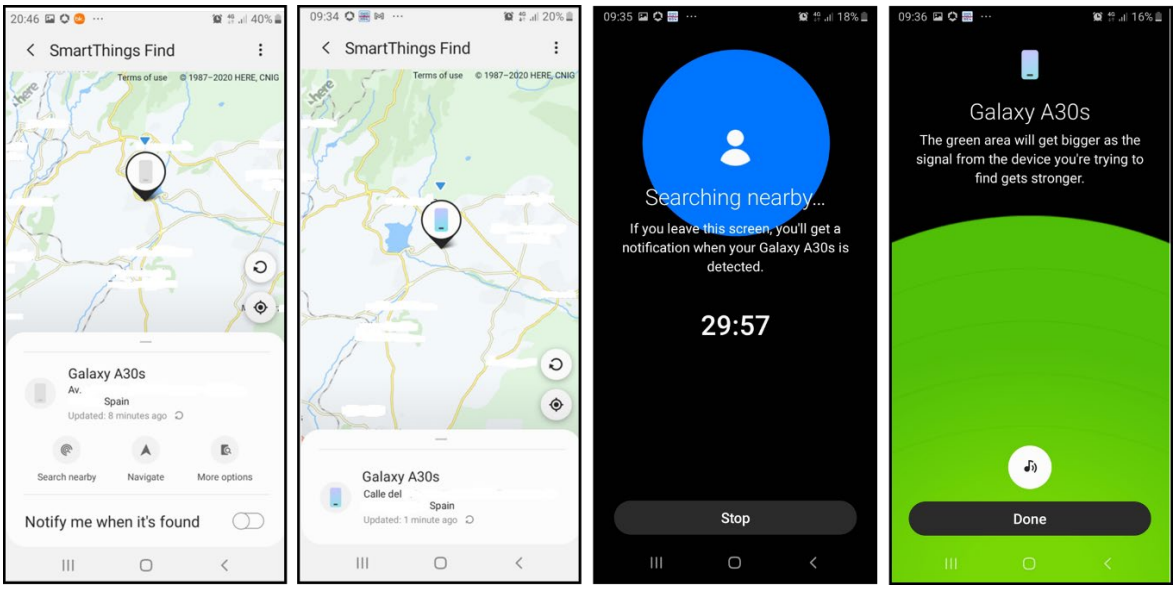


Figure 5: SmartThings Find

206. For example, when the user is nearby the found Samsung Galaxy A30s Device, he/she may enable the "search nearby" feature to facilitate the proximity searching of the device (as illustrated in the third and fourth images above). The following image further shows a Galaxy SmartTag located in a Find map thanks to offline finding (as a result of the activation (2) referred to above).

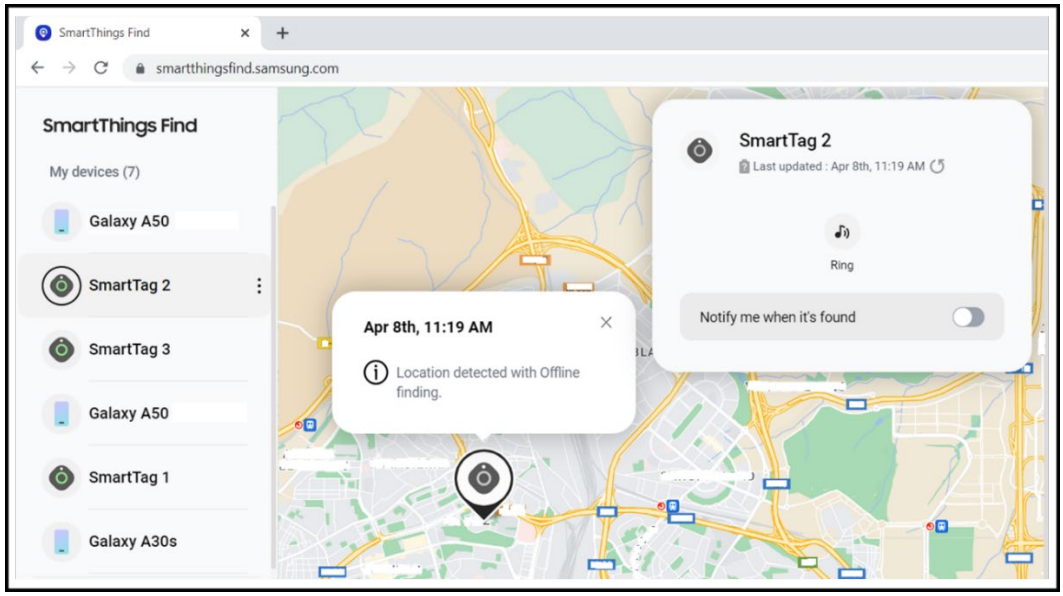


Figure 6: Galaxy SmartTag (available on https://smartthingsfind.samsung.com/ account)

207. For further example, when the Samsung Cloud servers adjusts the [lost/found] service flag operational parameter to "found" as detailed above, as a result of receiving the presence updating signal, the adjustment also serves to activate a presence related service related to the sending of an acknowledgment signal to the helping mobile station. As in the previous examples, the presence related service is provided to the helping mobile station as it is the entity triggering the updating signal, that is the service request. The acknowledgement presence related service is partly processed by the provider of presence related services, i.e., by the Samsung Cloud that generates the ack once the operation to update the device status to "found" has been successful, and partly processed by the helping mobile station, that receives the ack and set a 20 min delay for reporting any lost device it has already reported. For example, a 20 minute delay is set within the helping mobile station based upon the received indication from the Samsung Cloud that the "found" location report has been successful.

> The helper device then stops scanning and starts the location reporting process. Firstly, it accesses the SQL database to get the list of lost devices to report. Then the helper uses any available location services (GPS, Wi-Fi etc.) to pinpoint its own location and record it. The next process differs depending on whether the user has chosen to encrypt their location or not.
>
> - Unencrypted: The helper device creates a HTTPS request containing the lost device's private ID and its unencrypted latitude/longitude. The request is then sent to Samsung's location reporting server.
> - Encrypted: The helper device first contacts Samsung (over HTTPS) to receive a public key. Then it creates another HTTPS request containing the lost device's private ID and its latitude/longitude. The latitude/longitude are encrypted using an Elliptic Curve Integrated Encryption Scheme (ECIES) with the public key that was received from Samsung. The request is then sent to Samsung's location reporting server.
>
> In both cases, the helper device receives a response indicating the success of the operation and the lost device location reporting process finished. The helper device returns to scanning but with a timeout (20 mins) for reporting any lost devices it has already reported.

Ex. 12, at 9, § 3.2.3.

208. For example, the beneficiary of the presence related service is the helping mobile station, that can adapt the reporting process based upon the received acknowledgement. The updating signal is triggered as a result of the helping mobile station receiving the distinctive defining signal indicative that the lost device is in an offline status. Thus, the updating signal related to the offline finding service is, by its nature, indicative that the found device is in an offline status. The offline status is also inferred by the Samsung Cloud servers from the fact that the mobile station identifier (i.e., the IMEI within the received updating signal) and the identifier of the found device (also included in the received updating signal) do not relate to the same SmartThings account, which imply that the IMEI relates to the one of a helping mobile station and the found device is in an offline status. As elaborated above the offline status is indicative that the found

radio communication defining device is located in a predetermined environment (i.e., an environment that is outside the environment defined as the sum of the volumetric spaces wherein the BLE signal from the missing user´s device can be received in each of the other user´s Galaxy devices associated to the same user´s account).

209. The Accused Products perform sending from the one or more servers to the mobile station second checking data different from the first checking data to modify the special area. For example, as noted above, first and second checking data may correspond to a first and second mobile device. The special area can be modified by sending second checking data from server(s) that corresponds to the second mobile device instead of the first mobile device.

210. Defendants have and continue to indirectly infringe one or more claims of the ’032 Patent by inducing infringement by others, such as Defendants’ customers and end-users, in this District and elsewhere in the United States. For example, Defendants’ customers and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the ’032 Patent. Defendants induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. *See, e.g.*, Exhibit 14, available at https://www.samsung.com/us/smartthings/#get-started (instructions to “Let’s get started with SmartThings”); *see also, e.g.,* Exhibit 15, available at https://www.samsung.com/us/support/downloads/?model=N0002100 (providing the product manuals for mobile devices including phones, tablets, wearables, audio, virtual reality, and other mobile accessories).

211. Because of Defendants' inducement, Defendants' customers and end-users use the Accused Products in a way Defendants intend and they directly infringe the '032 Patent. Defendants perform these affirmative acts with knowledge of the '032 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '032 Patent.

212. Defendants have indirectly infringed and continues to indirectly infringe one or more claims of the '032 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Defendants' affirmative acts of selling and offering to sell the '032 Accused Products in this District and elsewhere in the United States and causing the '032 Accused Products to be manufactured, used, sold, and offered for sale contribute to others' use and manufacture of the Accused Products, such that the '032 Patent is directly infringed by others. The accused components within the Accused Products including, but not limited to, software manufactured by Defendants, are material to the invention of the '032 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Defendants to be especially made or adapted for use in the infringement of the '032 Patent. Defendants perform these affirmative acts with knowledge of the '032 Patent and with intent, or willful blindness, that they cause the direct infringement of the '032 Patent.

213. Because of Defendants' direct and indirect infringement of the '032 Patent, ALT has suffered damages in an amount to be proved at trial.

DEMAND FOR JURY TRIAL

Plaintiff hereby demands a jury for all issues so triable.

PRAYER FOR RELIEF

WHEREFORE, ALT prays for relief against Defendants as follows:

a. Entry of judgment declaring that Defendants has directly and/or indirectly infringed one or more claims of each of the Patents-in-Suit;

b. An order awarding damages sufficient to compensate ALT for Defendants' infringement of the Patents-in-Suit, but in no event less than a reasonable royalty, together with pre-judgment and post-judgment interest and costs;

c. Enhanced damages pursuant to 35 U.S.C. § 284;

d. Entry of judgment declaring that this case is exceptional and awarding ALT its costs and reasonable attorney fees under 35 U.S.C. § 285; and

e. Such other and further relief as the Court deems just and proper.

Dated: February 23, 2024

Respectfully submitted,

/s/ Alfred R. Fabricant

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